

Exhibit 3

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7 CRANE CO.

8 UNITED STATES DISTRICT COURT
9 NORTHERN DISTRICT OF CALIFORNIA
10 SAN FRANCISCO DIVISION

11 BARRY KELLY and
12 MOLLY KELLY,

13 Plaintiffs,

14 v.

15 THOMAS DEE ENGINEERING
COMPANY; Defendants as Reflected on
16 Exhibit 1 attached to the Summary
complaint herein; and DOES 1-8500.

17 Defendants.

Civil Action No.
(Superior Court of the State of California
for the County of San Francisco, CA
NO. CGC-11-275824)

NOTICE OF REMOVAL

18
19 **AFFIDAVIT OF ANTHONY D. PANTALEONI**

20 I, Anthony D. Pantaleoni, declare:

21
22 1. I am Vice-President of Environment, Health and Safety for Crane Co., and have
23 served in that position since 1989. I have been authorized to make the statements contained herein on
24 behalf of Crane Co. I have personal knowledge of the matters set forth in this declaration and could
25 and would competently testify to those matters.

26 2. In performing my duties as Crane Co.'s Vice-President of Environment, Health and
27 Safety, it has been my responsibility to represent Crane Co. as its "Person Most Knowledgeable"
28 concerning various subjects that arise in asbestos litigation, as well as to verify Crane Co.'s responses

1 to discovery requests from other parties in asbestos litigation. In connection with those duties, I have
2 researched and reviewed numerous documents, and interviewed current and past employees of Crane
3 Co. concerning historical Crane Co. manufacturing operations.

4 3. I am knowledgeable regarding the United States Navy ("Navy")'s involvement in and
5 control over the design and manufacture of equipment, including valves, it purchased from Crane Co.

6 4. Crane Co. made and supplied equipment, including valves, for Navy ships under
7 contracts between Crane Co. and the shipyards and/or the United States of America, specifically the
8 Navy Department.

9 5. The manufacture of equipment for use on Navy vessels was governed by an extensive
10 set of federal standards and specifications, chiefly military specifications known as Navy
11 Specifications and later "MilSpecs." The MilSpecs governed all aspects of a piece of equipment,
12 such as a valve's, design and construction and specified the materials to be used, including materials
13 such as gaskets and packing used in equipment. Exemplars of these MilSpecs are attached as exhibits
14 A and B.

15 6. All equipment supplied by Crane Co. to the Navy was built in accordance with the
16 Navy specifications.

17 Pursuant to 28 USC § 1746, I declare under penalty of perjury under the laws of the United
18 States of America that the foregoing is true and correct.

19
20 Executed on June, 7, 2011.
21
22

23 
24 Anthony D. Pantaleoni
25
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27
28

Exhibit A

15 May 1938

45V17(INT)-

BUREAU OF ENGINEERING SPECIFICATION
VALVES, GATE, FOR AIR EXHAUST STEAM, OIL, OR WATER SERVICES
(SHIPBOARD USE)

A. APPLICABLE SPECIFICATIONS AND DRAWINGS.

A-1. The following specifications, of the issue in effect on date of invitation for bids, form a part of this specification, and bidders and contractors should provide themselves with the necessary copies.

NAVY DEPARTMENT SPECIFICATIONS

General Specifications for Inspection of Material, together with Appendix II (Metals).

- 33P14 - Packing, asbestos, valve stem, symbol 1101.
- 33P16 - Packing, asbestos, rod, high pressure, symbol 1100.
- 33P17 - Packing, metallic, flexible, symbols 1430 and 1431.
- 43B11 - Bolts, nuts, studs, tap rivets (and material for same).
- 43B14 - Bolt-studs, nuts, and rod; steel (for service at temp. up to 850° F.)
- 44T2 - Threads, standard, for pipe and pipe fittings.
- 45V1 - Valves, bronze, 100 W.S.P., gate.
- 46B6 - Brass, Naval, rolled.
- 46B8 - Bronze, valve: Castings.
- 46M6 - Metal, gun: Castings.
- 46M7 - Nickel-copper alloy; rods, bars, shapes, etc.
- 46S18 - Steel, corrosion-resisting; bars, rods, and forgings, (except for reforging).
- 46S27 - Steel, corrosion-resisting: Castings.
- 49S1 - Steel; castings.
- 49S2 - Steel; forgings for hulls, engines and ordnance.

BUREAU OF ENGINEERING SPECIFICATIONS

General Specifications for Machinery, Subsection S1-1.

A-2. The following Bureau of Engineering drawings, of the alteration in effect on date of invitation for bids, form a part of this specification, and bidders and contractors should provide themselves with the necessary copies:

- B-64 - Hand wheels for valves.
- B-139 - Composition flanges, 100 lbs.
- B-140 - Composition flanges, 400 lbs.
- B-141 - Steel flanges, 400 lbs.
- P. 153 - Standard application of annual contract packings.
- B-159 - Steel flanges, 800 lbs.
- B-160 - Type quick closing valves.
- B-161 - Type hose gate valve.
- B-173 - Forged steel unions.

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- B-174 - Steel flanges, 750 lbs.
 - B-530 - Forged steel welding end fittings.
 - 6-Y-554 - Schedule for piping, pipe fittings, valves, etc.

B. CLASSES.

B-1. Gate valves shall be of the following classes:

- Class I - For working pressures not greater than 100 pounds per square inch threaded and flanged ends - composition. (also in steel for oil services, as required by schedule for valves, etc., Bureau drawing 6-Y-554 as listed in Section A.)
- Class II - For working pressures from 101 to 200 pounds per square inch, smaller than 2 inch size, threaded ends - composition.
- Class III - For working pressures from 101 to 400 pounds per square inch threaded, and flanged ends - composition.
- Class IV - For working pressures from 101 to 400 pounds per square inch, sizes 3/4 inch and larger, flanged ends - cast (or forged) steel.
- Class V - For working pressures from 401 to 600 pounds per square inch, sizes 3/4-inch and larger, flanged ends - cast (or forged) steel.
- Class VI - For working pressures from 601 to 750 pounds per square inch, sizes 3/4-inch and larger, flanged ends - cast (or forged) steel.

C. MATERIAL AND WORKMANSHIP.

C-1. Material. Unless otherwise approved, all materials used in the construction of valves shall be as specified in Section E.

C-2. Workmanship.- All castings shall be clean, sound and free from blow holes, porosity, cracks and any other injurious defects. The workmanship shall be first class in all respects.

D. GENERAL REQUIREMENTS.

D-1. Plans.- Plans shall be furnished as required by the bureau concerned.

D-1a. Bureau of Engineering.

D-1a(1). The number, size, arrangement, title, form, etc., shall conform to the requirements of Subsection Sl-1, referred to in Section A.

D-1a(2). The specific plans desired and the information thereon shall include the following:

- Type A.
- Type B.
- Type D.

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D-1a(3). Type A drawings shall accompany bids.

D-1a(4). The number of sets of Type B and Type D drawings, if required, shall be stated in the requisition, contract or order.

D-2. All valves shall be of the non-rising stem design and so constructed that the stem will not be exposed to the fluid passing through the valve, except that entering the drain hole, when the disk is raised to the full open position.

D-3. All valves when fully open shall permit an unobstructed flow and the area at any point within the valve shall be not less than the inside area of the pipe or tubing to which connected.

D-4. All valves shall be so designed that the valve stem may be packed when the valve is in the full open position.

D-5. All disks shall be of the wedge-type double faced design, made in one piece.

D-6. All valves shall be provided with disk guides cast integral with the body.

D-7. Each disk shall have an opening in the bottom to provide drainage.

D-8. Each stem shall be so threaded with acme type threads that the valve will be opened when the handwheel is turned counter-clockwise. The end of each stem shall be square and tapered to fit the handwheel. The stem shall be threaded above the tapered section to provide for a hexagonal securing nut.

D-9. The stem and thrust collar shall be one integral piece.

D-10. Unless otherwise specified, each valve 2-1/2 inches and larger shall be provided with an indicator to show whether the valve is open or closed.

D-11. Each valve shall have distinctly cast or stamped on one side of the body, the size, the trade mark of the maker "100" for Class I valves, "200" for Class II valves, "400" for Class III valves, "400" for Class IV valves, "600" for Class V valves, and "750" for Class VI valves; and the size of the valve. Valves for oil shall also have the word 'oil' cast or stamped on the bodies.

D-12. Faces of all flanges shall have at least a fine tool finish.

D-13. The walls of bodies and bonnets shall be curved surfaces; no flat surfaces shall be permitted. They shall be ribbed as required to prevent distortion.

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D-14. Stuffing boxes shall be separate from the valve bonnets. For valves of 2-1/2 inch size, and above, the glands shall be of the flanged type set up by two nuts working on studs extending through the gland flange.

D-15. All composition gate valves of 2-1/2 inch size and above, and all steel gate valves shall have removable seats. Removable seats shall be screwed into the valve bodies, suitable lugs being provided on the seats for the purpose. The faces of the seats shall be slightly raised at the center to provide a narrow bearing surface not to exceed one-eighth inch in width.

D-16. All gate valves, Classes III, IV, V and VI, 4-1/2 inch size or larger shall be fitted with by passes. The by-pass valves shall be globe valves, the materials of which shall correspond to the gate valves served. The minimum sizes for the by-passes are given below in Table I.

TABLE I.

Size of gate valve	Size of by-pass valve
4-1/2 inches to 7-1/2 inches, incl.	1/2 inch, minimum
8 inches to 9-1/2 inches, incl.	3/4 inch, minimum
10 inches and above	1 inch, minimum

NOTE. - All by-passes shall be connected to their valves by flanged joints.

D-17. Valve stems shall be packed with one of the packings conforming to N.D. Specs. 33P14, 33P16, or 33P17, referred to in Section A.

E. DETAIL REQUIREMENTS.

E-1. Class I Gate Valves.-

E-1a. Valves shall conform in every particular to N.D. Spec. 45V1, referred to in Section A, except those ordered in steel, which shall conform to N.D. Spec. 45V1 for design and subparagraph E-4o(1) for materials, except that the "bolts" or "studs" and "nuts", shall be steel, N.D. Spec. 43B11, referred to in Section A, Classes B and C, respectively.

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E-2. Class II Gate Valves.

E-2a. Valves shall be supplied only with threaded ends and in sizes and with dimensions shown in Table II.

TABLE II.

Size of pipe for which valves are used	Dimensions	
	Diameter of handwheel-minimum	Distance centerline to top maximum
Inches	Inches	Inches
1/4	1-1/2	4
1/2	1-3/4	4-1/4
3/4	2-1/2	5
1	2-3/4	5-3/4
1-1/4	3	6-1/2
1-1/2	3-1/2	7-1/2

E-2b. The threaded ends shall conform to the requirements of N.D. Spec. 44T2, referred to in Section A.

E-2c. Materials shall be the same as those specified for Class I gate valves.

E-2d. Bonnets may be screwed, or flanged and bolted.

E-2e. Handwheels shall be of malleable iron of non-heat design having three or more spokes. See Table II for minimum diameters.

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E-3. Class III Gate Valves

E-3a. Valves shall be supplied with threaded or flanged ends as specified in sizes 1-1/2 inches and smaller; and with flanged ends only in sizes 2 inches and above. The dimensions shall conform to those shown in Table III.

TABLE III.

Size of pipe : or tubing for: which used	Dimensions			
	Flanged valves		Handwheel	Height - Centerline
	Diam. of bore	Face to face	Diameter - minimum	to top - maximum
Inches	Inches	Inches	Inches	Inches
1/4	---	---	1-3/4	8
1/2	---	---	2-1/2	8-1/2
3/4	1	5	2-3/4	9
1	1-1/4	5-1/4	3	10-1/2
1-1/4	1-1/2	6	3-1/2	11
1-1/2	2	7	4	12
2	2-1/2	7-1/2	8	13
2-1/2	3	8	9	15
3	3-1/2	8-1/2	10	16
3-1/2	4	9	11	17
4	4-1/2	9-1/2	11	18-1/2
4-1/2	5	10	12	20
5	5-1/2	10-1/4	12	21-1/2
5-1/2	6	10-1/2	14	23
6	6-1/2	10-3/4	16	24-1/2
6-1/2	7	11	18	26
7	7-1/2	11-1/4	18	27-1/2
7-1/2	8	11-1/2	18	29
8	8-1/2	11-3/4	21	30-1/2
8-1/2	9	12	21	32
9	9-1/2	12-1/2	21	33-1/2
9-1/2	10	13	21	35
10	10-1/2	13-1/2	21	36-1/2

E-3b. The threaded ends shall conform to the requirements of N.D. Spec. 44T2, referred to in Section A.

E-3c. The dimensions of flanges shall conform to Bureau of Engineering drawing B-140, referred to in Section A.

E-3d. Unless otherwise specified, valves shall be delivered with the flanges indrilled.

E-3e. Materials shall be the same as those specified for Class I valves.

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E-3f. Bonnets for valves 1-1/2 inches and smaller may be screwed. Those for valves 2 inches and larger shall be flanged. Flanged bonnets shall be bolted with bolt studs threaded full length and fitted with a nut on each end.

E-3g. Handwheels for valves, sizes 1-1/2 inches and smaller, shall be of the same type as specified for Class II valves. Handwheels for valves, sizes 2 inches and larger, shall conform to Bureau of Engineering drawing E-64, referred to in Section A, and shall have diameters not less than those given in Table III.

E-4. Class IV Gate Valves.

E-4a. Valves shall have flanged ends and be made only of steel, cast or forged, in all sizes and of dimensions as shown in Table IV.

TABLE IV.

Size of pipe or : tubing for which: used	Dimensions				
	Diameter of : Bore	Face to Face	Handwheel : Diameter	Height - Centerline : to	Top - Maximum
Inches	Inches	Inches	Inches	Inches	Inches
3/4	1	5	3-1/4	10	
1	1-1/4	5-1/4	4	11	
1-1/4	1-1/2	6	5	11-1/2	
1-1/2	2	7	6	12-1/2	
2	2-1/2	7-1/2	8	13-1/2	
2-1/2	3	8	9	15-1/2	
3	3-1/2	8-1/2	10	16-1/2	
3-1/2	4	9	11	17-1/2	
4	4-1/2	9-1/2	11	19	
4-1/2	5	10	12	20-1/2	
5	5-1/2	10-1/4	12	22	
5-1/2	6	10-1/2	14	23-1/2	
6	6-1/2	10-3/4	16	25	
6-1/2	7	11	18	26-1/2	
7	7-1/2	11-1/4	18	28	
7-1/2	8	11-1/2	18	29-1/2	
8	8-1/2	11-3/4	21	31	
8-1/2	9	12	21	32-1/2	
9	9-1/2	12-1/2	21	34	
9-1/2	10	13	21	35-1/2	
10	10-1/2	13-1/2	21	37	

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E-4b. The dimension of flanges shall conform to Bureau of Engineering drawing B-141, referred to in Section A.

E-4c. Unless otherwise specified, valves shall be delivered with the flanges undrilled.

E-4d. Materials shall be as follows:

(1) Oil Service.

Body bonnet, stuffing box and gland - Class B cast steel (N.D. Spec. 49S1) or Class B forged steel (N.D. Spec. 49S2).

Disk and seat - Grade 7 corrosion-resisting steel (N.D. Spec. 46S18) or Grade 7 corrosion-resisting steel, cast (N.D. Spec. 46S27), The disk may be Class B cast steel (N.D. Spec. 49S1) fitted with seating face of either of the former materials.

Stem - Grade 7 corrosion-resisting steel (N.D. Spec. 46S18).

Stem nut, index unit and scale - brass.

Bolt-studs and nuts - steel, (N.D. Spec. 43B14).

Bolts and nuts - (N.D. Spec. 43B11).

(2) Air, Exhaust Steam or Water Services.

Body, bonnet and stuffing box - same materials as specified for "Oil Service".

Disk and seat - Gun metal (N.D. Spec. 46M6) or special composition of non-galling characteristics as approved.

Stem - nickel-copper alloy, rolled (N.D. Spec. 46M7).

Stuffing box gland, stem nut, index units and scale - brass.

Bolt -studs and nuts - steel (N.D. Spec. 43B14).

Bolt and nuts - (N.D. Spec. 43B11).

E-4e. Bonnets shall be flanged and bolted with bolt studs threaded full length and fitted with a nut on each end.

E-4f. Handwheels shall conform to Bureau of Engineering drawing B-64, referred to in Section A, and shall have diameters not less than those given in Table IV.

E-5. Class V Gate Valves.

E-5a. Valves shall have flanged ends, shall be made in all sizes, and shall be of the dimensions given in Table V.

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TABLE V.

Size of pipe or tubing for which used	Dimensions				
	Diameter of Bore	Face to face over raised surface	Handwheel Diameter Minimum	Height Center- line to top - maximum	
Inches	Inches	Inches	Inches	Inches	
3/4	3/4	7-1/2	6	8-1/2	
1	1	8-1/2	7	9-1/2	
1-1/4	1-1/4	9	7	11	
1-1/2	1-1/2	9-1/2	8	12-1/2	
2	2	11-1/2	8	15	
2-1/2	2-1/2	13	9	16-5/8	
3	3	14	10	18-1/4	
3-1/2	3-1/2	15	10	19	
4	4	16	12	22	
4-1/2	4-1/2	17	12	24	
5	5	18	14	26	
5-1/2	5-1/2	19	16	27-1/4	
6	6	19-1/2	16	28-1/4	
6-1/2	6-1/2	20-1/2	18	30	
7	7	21-1/2	18	31	
7-1/2	7-1/2	22-1/2	18	33	
8	8	23-1/2	21	35	
8-1/2	8-1/2	24-1/4	21	35	
9	9	25	21	37	
9-1/2	9-1/2	25-3/4	21	38	
10	10	26-1/2	21	39	

E-5b. The dimensions of flanges shall conform to Bureau of Engineering drawings E-159 and 3-S-530 referred to in Section A. Raised surfaces on all valve flanges shall be 1/4-inch in height.

E-5c. Valves shall be furnished with flanges drilled; bolt holes to straddle the center lines.

E-5d. Materials shall be the same as specified for Class IV valves.

E-5e. Bonnets shall be bolted with bolt-studs threaded full length and fitted with a nut on each end.

E-5f. Handwheels shall conform to Bureau of Engineering drawing 3-64, referred to in Section A, and shall have diameters not less than those given in Table V.

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E-6. Class VI Gate Valves.

E-6a. Valves shall have flanged ends, shall be made in all sizes, and shall be of the dimensions given in Table VI.

TABLE VI.

Size of pipe :			Dimensions		
or tubing for :	Diameter :	Face to face over :	Handwheels :	Height centerline	
which used :	of bore :	raised surface :	Diameter, minimum :	to top - maximum	
Inches :	Inches :	Inches :	Inches :	Inches	
3/4 :	3/4 :	7-1/2 :	6 :	10-1/2	
1 :	1 :	8-1/2 :	7 :	11	
1-1/4 :	1-1/4 :	9 :	7 :	11-1/2	
1-1/2 :	1-1/2 :	9-1/2 :	8 :	13	
2 :	2 :	11-1/2 :	9 :	16-1/2	
2-1/2 :	2-1/2 :	13 :	9 :	17	
3 :	3 :	14 :	10 :	19	
3-1/2 :	3-1/2 :	15-1/2 :	12 :	19-1/2	
4 :	4 :	17 :	14 :	24	
4-1/2 :	4-1/2 :	18-1/2 :	14 :	26	
5 :	5 :	20 :	16 :	28	
5-1/2 :	5-1/2 :	21 :	18 :	29	
6 :	6 :	22 :	18 :	30-1/2	
6-1/2 :	6-3/8 :	23 :	21 :	32-1/2	
7 :	6-7/8 :	24 :	21 :	33-1/2	
7-1/2 :	7-3/8 :	25 :	21 :	35-1/2	
8 :	7-7/8 :	26 :	24 :	37-1/2	
8-1/2 :	8-3/8 :	27-1/4 :	24 :	38-1/2	
9 :	8-3/4 :	28-1/2 :	24 :	39-1/2	
9-1/2 :	9-1/4 :	29-3/4 :	24 :	40-1/2	
10 :	9-3/4 :	31 :	27 :	41-1/2	

E-6b. The dimensions of flanges shall conform to Bureau of Engineering drawings B-174 and 3-S-530, referred to in Section A. Raised faces on all valves shall be 1/4-inch in height.

E-6c. Valves shall be furnished with flanges drilled; bolt holes to straddle the center lines.

E-6d. Materials shall be the same as specified for Class IV valves.

E-6e. Bonnets shall be bolted with bolt-studs threaded full length and fitted with a nut on each end.

E-6f. Handwheels shall conform to Bureau of Engineering drawing B-64, referred to in Section A, and shall have diameters not less than those given in Table VI.

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F. METHODS OF SAMPLING, INSPECTION AND TESTS.

F-1. Chemical and physical tests shall be made on samples of material taken during manufacture as required by the specifications covering the various materials used.

F-2. Each valve shall be inspected for defects of workmanship and compliance with specified dimensions.

F-3. Each valve shall be tested as follows:

- (a) By hydrostatic pressure, as tabulated below, for strength and porosity with the gate open.
- (b) By hydrostatic pressure, as tabulated below, for tightness on seat with the gate closed by hand and without the use of a wrench or equivalent, the pressure to be applied alternately on both sides of the gate with the side opposite the pressure open for inspection in each case.

Hydrostatic Test Pressure

	<u>(1) Open</u>	<u>(2) Closed</u>
Class I.....	200 lbs. per sq. in. gage	100 lbs. per sq. in. gage
Class II.....	300 lbs. per sq. in. gage	200 lbs. per sq. in. gage
Class III.....	600 lbs. per sq. in. gage	400 lbs. per sq. in. gage
Class IV.....	750 lbs. per sq. in. gage	400 lbs. per sq. in. gage
Class V.....	1000 lbs. per sq. in. gage	500 lbs. per sq. in. gage
Class VI.....	1500 lbs. per sq. in. gage	750 lbs. per sq. in. gage

F-4. The appliance for the hydrostatic testing of flanged valves shall not restrict longitudinal expansion.

G. PACKAGING, PACKING AND MARKING FOR SHIPMENT.

G-1. Packing.-- Unless otherwise specified, the subject commodity shall be delivered in substantial wooden containers so constructed as to insure safe delivery by common or other carriers to the point of delivery at the lowest rate, and to withstand further shipment and handling if necessary without repacking. A single container, when packed for shipment, shall weigh not in excess of approximately 250 pounds gross. Valves weighing in excess of 125 pounds each shall be packed singly. Not more than one size, type, or kind of valves shall be packed in a single container.

G-2. Marking.-- Unless otherwise specified, shipping containers shall be marked with the name of the material, the class, size and the quantity contained therein as defined by the contract or order under which shipment is made, the name of the contractor, the number of the contract or order and the gross weight.

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H. NOTES.

H-1. Requisitions and contracts or orders should state the quantity of each class and the size of valves desired and the number of Type B and D drawings desired.

H-2. This specification supersedes Supplementary General Specification for Machinery, SGS(48)-20 formerly issued by the Bureau of Engineering, Navy Department, Washington, D.C.

H-3. Copies of Drawings and Specifications.

H-3a. Copies of Drawings.- Copies of Bureau of Engineering drawings may be obtained only upon application to the Bureau of Engineering, Navy Department, Washington, D.C. When requesting refer to drawings by both title and number.

H-3b. Copies of Bureau of Engineering Specifications.- Copies of Bureau of Engineering Specifications may be obtained only upon application to the Bureau of Engineering, Navy Department, Washington, D.C. When requesting, refer to Specification by both title and number.

H-3c. Copies of Navy Department Specifications.- Copies of Navy Department Specifications may be obtained upon application to the Bureau of Supplies and Accounts, Navy Department, Washington, D.C., except that Naval activities should make application to the Commandant, Navy Yard, New York, N.Y. When requesting, refer to specification by both title and number.

15 January 1938

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(SHIPBOARD USE)

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- 49S2 - Steel; Forgings for hulls, engines and ordnance.

BUREAU OF ENGINEERING SPECIFICATIONS

General Specifications for Machinery, Subsection S1-1.

A-2. The following Bureau of Engineering drawings, of the latest alteration in effect on date of invitation for bids, form a part of this specification, and bidders and contractors should provide themselves with the necessary copies:

- B-64 - Hand wheels for valves.
- B-139 - Composition flanges, 100 lbs.
- B-140 - Composition flanges, 200 and 400 lbs.
- B-141 - Steel flanges, 400 lbs.
- B-153 - Standard application of annual contract packings.
- B-159 - Steel flanges, 600 lbs.
- B-160 - Type quick closing valves.
- B-161 - Type hose gate valve.
- B-173 - Forged steel unions.

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- B-174 -- Steel flanges.
- 3-S-530 -- Forged steel welding end fittings.
- 6-Y-554 -- Schedule for piping, pipe fittings, valves and type of joints used in piping systems.

B. CLASSES.

B-1. Gate valves shall be of the following classes:

- Class I -- For working pressures not greater than 100 pounds per square inch threaded and flanged ends -- composition. (also in steel for oil services, as required by schedule for valves, etc., Bureau drawing 6-Y-554 as listed in Section A.)
- Class II -- For working pressures from 101 to 200 pounds per square inch, smaller than 2 inch size, threaded ends -- composition.
- Class III -- For working pressures from 101 to 400 pounds per square inch threaded, and flanged ends -- composition.
- Class IV -- For working pressures from 101 to 400 pounds per square inch, sizes 3/4 inch and larger, flanged ends -- cast (or forged) steel.
- Class V -- For working pressures from 401 to 600 pounds per square inch, sizes 3/4 inch and larger, flanged ends -- cast (or forged) steel.
- Class VI -- For working pressures from 601 to 750 pounds per square inch, sizes 3/4 inch and larger, flanged ends -- cast (or forged) steel.

C. MATERIAL AND WORKMANSHIP.

C-1. Departures from Referenced Specifications.-- The use of materials differing from the referenced Navy Department specifications will be considered when it can be clearly demonstrated that an improvement in operating characteristics, or a saving in weight without sacrifice in reliability can be accomplished thereby, or that such substitutes do not preclude the subsequent use of Navy standard materials in effecting repairs or replacements necessitated by service wear. Specific approval shall be obtained where departures are made from the referenced specifications.

C-2. Materials.-- All materials used in the construction of valves shall be as specified in Section E. Alternate materials will be considered in lieu of those specified but their use will only be permitted after the bureau concerned has been satisfied by test or other means that the proposed substitutes fully meet the service requirements.

C-3. Threaded Parts; Standard Bolts, Nuts and Machine Screws.-- Bolts and nuts shall conform to N.D. Specs. 43B11, and 43B14 referred to in Section A.

C-4. Workmanship.-- All castings shall be clean, sound and free from blow holes, porosity, cracks and any other injurious defects. The workmanship shall be first class in all respects.

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D. GENERAL REQUIREMENTS.

D-1. Plans.— Plans shall be furnished as required by the bureau concerned.

D-1a. Bureau of Engineering.

D-1a(1). The number, size, arrangement, title, form, etc., shall conform to the requirements of Subsection SI-1, referred to in Section A.

D-1a(2). The specific plans desired and the information thereon shall include the following:

Type A.
Type B.
Type D.

D-1a(3). Type A drawings shall accompany bids.

D-1a(4). The number of sets of Type B and Type D drawings, if required, shall be stated in the requisition, contract or order.

D-2. All valves shall be of the non-rising stem design and so constructed that the stem will not be exposed to the fluid passing through the valve, except that entering the drain hole, when the disk is raised to the full open position.

D-3. All valves when fully open shall permit an unobstructed flow and the area at any point within the valve shall be not less than the inside area of the pipe or tubing to which connected.

D-4. All valves shall be so designed that the valve stem may be packed when the valve is in the full-open position.

D-5. All disks shall be of the wedge-type double-faced design, made in one piece.

D-6. All valves shall be provided with disk guides cast integral with the body.

D-7. Each disk shall have an opening in the bottom to provide drainage.

D-8. Each stem shall be so threaded with acme type threads that the valve will be opened when the handwheel is turned counterclockwise. The end of each stem shall be square and tapered to fit the handwheel. The stem shall be threaded above the tapered section to provide for a hexagonal securing nut.

D-9. The stem and thrust collar shall be one integral piece.

D-10. Unless otherwise specified, each valve 2-1/2 inches and larger shall be provided with an indicator to show whether the valve is open or closed.

D-11. Each valve shall have distinctly cast or stamped on one side of the body, the size, the trade mark of the maker, "100" for Class I valves, "200" for Class II valves, "400" for Class III valves, "300" for Class IV valves, "400" for Class V valves, and "500" for Class VI valves; and the size of the valve. Valves for oil shall also have the word 'oil' cast or stamped on the bodies.

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D-12. The walls of bodies and bonnets shall be curved surfaces; no flat surfaces shall be permitted. They shall be ribbed as required to prevent distortion.

D-13. Stuffing boxes shall be separate from the valve bonnets. For valves of 2-1/2 inch size, and above, the glands shall be of the flanged type set up by two nuts working on studs extending through the gland flange.

D-14. All composition gate valves of 2-1/2 inch size and above, and all steel gate valves shall have removable seats. Removable seats shall be screwed into the valve bodies, suitable lugs being provided on the seats for the purpose. The faces of the seats shall be slightly raised at the center to provide a narrow bearing surface not to exceed one-eighth inch in width.

D-15. All gate valves, Classes III, IV, V and VI, 4-1/2 inch size or larger shall be fitted with by-passes. The by-pass valves shall be globe valves, the materials of which shall correspond to the gate valves served. The minimum sizes for the by-passes are given below in Table I.

TABLE I.

Size of gate valve	Size of by-pass valve
4-1/2 inches to 7-1/2 inches, incl.....	1/2 inch, minimum
8 inches to 9-1/2 inches, incl.:	3/4 inch, minimum
10 inches.....	1-inch, minimum

NOTE:- All by-passes shall be connected to their valves by flanged joints.

D-16. Valves stems shall be packed with one of the packings conforming to N.D. Specs. 33P14, 33P16, or 33P17, referred to in Section A.

E. DETAIL REQUIREMENTS.

E-1. Class I Gate Valves.

E-1a. Valves shall conform in every particular to N.D. Specs. 45V1, referred to in Section A, except when ordered in steel, which shall conform to N.D. Specs. 45V1 for design and subparagraph E-4c(1) for materials, but the "bolts" or "studs" and "nuts", shall be steel, N.D. Specs. 43B11, referred to in Section A, Classes B and C, respectively.

E-2. Class II Gate Valves.

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E-2a. Valves shall be supplied only with threaded ends and in sizes and with dimensions shown in Table II.

TABLE II.

Size of Pipe for: which Valves are: used		Dimensions	
Inches	:	Diameter of handwheel-minimum	: Distance centerline to top maxi- : mum
1/4	:	1-1/2	: 4
1/2	:	1-3/4	: 4-1/4
3/4	:	2-1/2	: 5
1	:	2-3/4	: 5-3/4
1-1/4	:	3	: 6-1/2
1-1/2	:	3-1/2	: 7-1/2

E-2b. The threaded ends shall conform to the requirements of M.D. Specs. 44T2, referred to in Section A.

E-2c. Materials shall be the same as those specified for Class I gate valves.

E-2d. Bonnets may be screwed, or flanged and bolted.

E-2e. Handwheels shall be of malleable iron of non-heat design having three or more spokes. See Table II for minimum diameters.

E-3. Class III Gate Valves.

E-3a. Valves shall be supplied with threaded or flanged ends as specified in sizes 1-1/2 inches and smaller; and with flanged ends only in sizes 2 inches and above. The dimensions shall conform to those shown in Table III.

TABLE III.

Size of Pipe : or Tubing for:		Dimensions			
Inches	:	Flanged Valves		Handwheel	Height - Centerline
		Diam. of Bore:	Face to Face:	Diameter- minimum	: to Top-Maximum
1/4	:	Inches	Inches	Inches	Inches
1/4	:	---	---	1-3/4	: 8
1/2	:	---	---	2-1/2	: 8-1/2
3/4	:	1	5	2-3/4	: 9
1	:	1-1/4	5-1/4	3	: 10-1/2
1-1/4	:	1-1/2	6	3-1/2	: 11
1-1/2	:	2	7	4	: 12
2	:	2-1/2	7-1/2	8	: 13
2-1/2	:	3	8	9	: 15
3	:	3-1/2	8-1/2	10	: 16
3-1/2	:	4	9	11	: 17
4	:	4-1/2	9-1/2	11	: 18-1/2
4-1/2	:	5	10	12	: 20
5	:	5-1/2	10-1/4	12	: 21-1/2
5-1/2	:	6	10-1/2	14	: 23
6	:	6-1/2	10-3/4	16	: 24-1/2
6-1/2	:	7	11	18	: 26
7	:	7-1/2	11-1/4	18	: 27-1/2
7-1/2	:	8	11-1/2	18	: 29
8	:	8-1/2	11-3/4	21	: 30-1/2
8-1/2	:	9	12	21	: 32
9	:	9-1/2	12-1/2	21	: 33-1/2
9-1/2	:	10	13	21	: 35
10	:	10-1/2	13-1/2	21	: 36-1/2

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E-3b. The threaded ends shall conform to the requirements of M. D. Specs. 44T2, referred to in Section A.

E-3c. The dimensions of flanges shall conform to Bureau standard E-140, referred to in Section A.

E-3d. Materials shall be the same as those specified for Class I valves.

E-3e. Bonnets for valves 1-1/2 inches and smaller may be screwed. Those for valves 2 inches and larger shall be flanged. Flanged bonnets shall be bolted with bolt studs threaded full length and fitted with a nut on each end.

E-3f. Handwheels for valves, sizes 1-1/2 inches and smaller, shall be of the same type as specified for Class II valves. Handwheels for valves, sizes 2 inches and larger, shall conform to Bureau standard E-64, referred to in Section A, and with diameters not less than those given in Table III.

E-4. Class IV Gate Valves.

E-4a. Valves shall have flanged ends and be supplied only of steel, cast or forged, in all sizes and of dimensions as shown in Table IV.

TABLE IV.

Size of Pipe or Tubing for which used	Dimensions				
	Diameter of Bore	Face to Face	Handwheel Diameter	Height to Centerline	
Inches	Inches	Inches	Minimum	to top-maximum	Inches
3/4	1	5	3-1/4		10
1	1-1/4	5-1/4	4		11
1-1/4	1-1/2	6	5		11-1/2
1-1/2	2	7	6		12-1/2
2	2-1/2	7-1/2	8		13-1/2
2-1/2	3	8	9		15-1/2
3	3-1/2	9-1/2	10		16-1/2
3-1/2	4	9	11		17-1/2
4	4-1/2	10	11		19
4-1/2	5	10-1/4	12		20-1/2
5	5-1/2	10-1/2	12		22
5-1/2	6	10-3/4	14		23-1/2
6	6-1/2	11	16		25
6-1/2	7	11-1/4	18		26-1/2
7	7-1/2	11-1/2	18		28
7-1/2	8	11-3/4	18		29-1/2
8	8-1/2	12	21		31
8-1/2	9	12-1/2	21		32-1/2
9	9-1/2	13	21		34
9-1/2	10	13-1/2	21		35-1/2
10	10-1/2		21		37

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E-4b. The dimension of flanges shall conform to Bureau standard B-141, referred to in Section A.

E-4c. Materials shall be as follows:

(1) Oil Service.

Body, bonnet, stuffing box and gland - Class D cast steel (N.D. Specs. 49S1) or Class B forged steel (N.D. Specs. 49S2).
Disk and seat - CRS-1 corrosion-resisting steel (N.D. Specs. 43S18) or free machining cast corrosion-resisting steel (N.D. Specs. 46S27). The disk may be Class D cast steel (N.D. Specs. 49S1) fitted with seating face of either of the former materials.
Stem - CRS-7 corrosion-resisting steel (N.D. Specs. 46S18).
Stem nut, index unit and scale - brass.
Bolt-studs and nuts - steel, (N.D. Specs. 43B14).
Bolts and nuts - (N.D. Specs. 43B11).

(2) Air, Exhaust Steam or Water Services.

Body, bonnet and stuffing box - same materials as specified for "Oil Service".
Disk and seat - Gun metal (N.D. Specs. 46M6) or special composition of non-galling characteristics as approved.
Stem - nickel-copper alloy, rolled (N.D. Specs. 46M7).
Stuffing box gland, stem nut, index units and scale - brass.
Bolt-studs and nuts - steel (N.D. Specs. 43B14).
Bolt and nuts - (N.D. Specs. 43B11).

E-4d. Bonnets shall be flanged and bolted with bolt studs threaded full length and fitted with a nut on each end.

E-4e. Handwheels shall conform to Bureau standard B-64, referred to in Section A, and with diameters not less than those given in Table IV.

E-5. Class V Gate Valves.

E-5a. Valves shall have flanged ends and be made in all sizes and of the dimensions given in Table V.

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TABLE V.

Size of Pipe or Tubing for which: used	Dimensions				
	Diameter of	Face to face over	Handwheel	Height Center-	
	Bore	raised surface	Diameter Minimum	line to top - maximum	
Inches	Inches	Inches	Inches	Inches	
3/4	3/4	7-1/2	6	8-1/2	
1	1	8-1/2	7	9-1/2	
1-1/4	1-1/4	9	7	11	
1-1/2	1-1/2	9-1/2	8	12-1/2	
2	2	11-1/2	8	15	
2-1/2	2-1/2	13	9	16-5/8	
3	3	14	10	18-1/4	
3-1/2	3-1/2	15	10	19	
4	4	16	12	22	
4-1/2	4-1/2	17	12	24	
5	5	18	14	26	
5-1/2	5-1/2	19	16	27-1/4	
6	6	19-1/2	16	28-1/4	
6-1/2	6-1/2	20-1/2	18	30	
7	7	21-1/2	18	31	
7-1/2	7-1/2	22-1/2	18	33	
8	8	23-1/2	21	35	
8-1/2	8-1/2	24-1/4	21	36	
9	9	25	21	37	
9-1/2	9-1/2	25-3/4	21	38	
10	10	26-1/2	21	39	

E-5b. The dimensions of flanges shall conform to Bureau drawings B-159 and 3-S-530 referred to in Section A. Raised surfaces on all valve flanges shall be 1/4 inch in height.

E-5c. Materials shall be the same as specified for Class IV valves.

E-5d. Bonnets shall be bolted with bolt-studs threaded full length and fitted with a nut on each end.

E-5e. Handwheels shall conform to Bureau standard B-64, referred to in Section A, and with diameters not less than those given in Table V.

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E-6. Class VI Gate Valves.

E-6a. Valves shall have flanged ends and be made in all sizes and of the dimensions given in Table VI.

TABLE VI.

Size of pipe or tubing for which used	Dimensions				
	Diameter of bore	Faces to face over raised surface	Handwheel Diameter, minimum	Height centerline to top - maximum	
Inches	Inches	Inches	Inches	Inches	
3/4	3/4	7-1/2	6	10-1/3	
1	1	8-1/2	7	11	
1-1/4	1-1/4	9	7	11-1/2	
1-1/2	1-1/2	9-1/2	8	13	
2	2	11-1/2	9	16-1/2	
2-1/2	2-1/2	13	9	17	
3	3	14	10	19	
3-1/2	3-1/2	15-1/2	12	19-1/2	
4	4	17	14	24	
4-1/2	4-1/2	18-1/2	14	26	
5	5	20	16	28	
5-1/2	5-1/2	21	18	29	
6	6	22	18	30-1/2	
6-1/2	6-3/8	23	21	32-1/2	
7	6-7/8	24	21	33-1/3	
7-1/2	7-3/8	25	21	35-1/2	
8	7-7/8	26	24	37-1/3	
8-1/2	8-3/8	27-1/4	24	38-1/3	
9	8-3/4	28-1/2	24	39-1/2	
9-1/2	9-1/4	29-3/4	24	40-1/3	
10	9-3/4	31	27	41-1/2	

E-6b. The dimensions of flanges shall conform to Bureau drawings E-174 and 3-S-530, referred to in Section A. Raised faces on all valves shall be 1/4-inch in height.

E-6c. Materials shall be the same as specified for Class IV valves.

E-6d. Bonnets shall be bolted with bolt-studs threaded full length and fitted with a nut on each end.

E-6e. Handwheels shall conform to Bureau standard E-64, referred to in Section A, and with diameters not less than those given in Table VI.

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F. METHODS OF SAMPLING, INSPECTION AND TESTS.

F-1. Chemical and physical tests shall be made on samples of material taken during manufacture as required by the specifications covering the various materials used.

F-2. Each valve shall be inspected for defects of workmanship and compliance with specified dimensions.

F-3. Each valve shall be tested as follows:

- (a) By hydrostatic pressure, as tabulated below, for strength and porosity with the gate open.
- (b) By hydrostatic pressure, as tabulated below, for tightness on seat with the gate closed by hand and without the use of a wrench or equivalent, the pressure to be applied alternately on both sides of the gate with the side opposite the pressure open for inspection in each case.

Hydrostatic Test Pressures

	<u>(1) Open</u>	<u>(2) Closed</u>
Class I -----	150 lbs. per sq. in.gage	100 lbs. per sq. in. gage
Class II -----	300 lbs. per sq. in.gage	200 lbs. per sq. in. gage
Class III -----	600 lbs. per sq. in.gage	400 lbs. per sq. in. gage
Class IV -----	750 lbs. per sq. in.gage	400 lbs. per sq. in. gage
Class V -----	1000 lbs. per sq. in.gage	500 lbs. per sq. in. gage
Class VI -----	1500 lbs. per sq. in.gage	750 lbs. per sq. in. gage

F-4. The appliance for the hydrostatic testing of flanged valves shall not restrict longitudinal expansion.

G. PACKAGING, PACKING AND MARKING FOR SHIPMENT.

G-1. Packing.-- Unless otherwise specified, valves shall be delivered in substantial commercial containers so constructed as to insure acceptance by common or other carrier for safe transportation at the lowest rate to the point of delivery.

G-2. Marking.-- Unless otherwise specified, shipping containers shall be marked with the name of the material, the class, size and the quantity contained therein as defined by the contract or order under which shipment is made, the name of the contractor and the number of the contract or order.

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H. NOTES.

H-1. Requisitions and contracts or orders should state the quantity of each class and the size of valves desired and the number of Type B and D drawings desired.

H-2. This specification supersedes Supplementary General Specification for Machinery, SGS(48)-20 formerly issued by the Bureau of Engineering, Navy Department, Washington, D. C.

H-3. Copies of Drawings and Specifications.--

H-3a. Copies of Drawings.-- Copies of Bureau of Engineering drawings may be obtained only upon application to the Bureau of Engineering, Navy Department, Washington, D. C. When requesting, refer to drawings by both title and number.

H-3b. Copies of Bureau of Engineering Specifications.-- Copies of Bureau of Engineering Specifications may be obtained only upon application to the Bureau of Engineering, Navy Department, Washington, D. C. When requesting, refer to Specification by both title and number.

H-3c. Copies of Navy Department Specifications.-- Copies of Navy Department Specifications may be obtained upon application to the Bureau of Supplies and Accounts, Navy Department, Washington, D. C. When requesting, refer to specification by both title and number.

10 November 1937

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BUREAU OF ENGINEERING SPECIFICATION
VALVES, GATE, FOR WATER, OIL, EXHAUST STEAM OR AIR SERVICES
(SHIPBOARD USE)

A. APPLICABLE SPECIFICATIONS AND DRAWINGS.

A-1. The following specifications, of the issue in effect on date of invitation for bids, form a part of this specification, and bidders and contractors should provide themselves with the necessary copies.

NAVY DEPARTMENT SPECIFICATIONS

General Specifications for Inspection of Material, together with Appendix II (Metals).

- 33P14 - Packing, asbestos, valve stem, symbol 1101.
- 33P16 - Packing, asbestos, rod, high pressure, symbol 1100.
- 33P17 - Packing, metallic, flexible, symbols 1430 and 1431.
- 43B11 - Bolts, nuts, studs, tap rivets (and material for same).
- 43B14 - Bolt-studs, nuts, and rod; steel (for service at temp. up to 850° F.)
- 44T2 - Threads, standard, for pipe and pipe fittings.
- 45V1 - Valves, bronze, 100 W.S.P., gate.
- 46B6 - Brass, naval, rolled.
- 46B8 - Bronze, valve: Castings.
- 46M6 - Metal, gun: Castings.
- 46M7 - Nickel-copper alloy; rods, bars, shapes, etc.
- 46S18 - Steel, corrosion-resisting; bars, rods, and forgings (except for reforging).
- 46S27 - Steel, corrosion-resisting: Castings.
- 49S1 - Steel; Castings.
- 49S2 - Steel; Forgings for hulls, engines and ordnance.

BUREAU OF ENGINEERING SPECIFICATIONS

General Specifications for Machinery, Subsection S1-1.

A-2. The following Bureau of Engineering drawings, of the latest alteration in effect on date of invitation for bids, form a part of this specification, and bidders and contractors should provide themselves with the necessary copies:

- B-64 - Hand wheels for valves.
- B-139 - Composition flanges, 100 lbs.
- B-140 - Composition flanges, 200 and 400 lbs.
- B-141 - Steel flanges, 400 lbs.
- B-153 - Standard application of annual contract packings.
- B-159 - Steel flanges, 600 lbs.
- B-160 - Type quick closing valves.
- B-161 - Type hose gate valve.
- B-173 - Forged steel unions.

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- B-174 -- Steel flanges.
- 3-S-530 -- Forged steel welding end fittings.
- 6-Y-554 -- Schedule for piping, pipe fittings, valves and type of joints used in piping systems.

B. CLASSES.

B-1. Gate valves shall be of the following classes:

- Class I -- For working pressures not greater than 100 pounds per square inch threaded and flanged ends -- composition. (also in steel for oil services, as required by schedule for valves, etc., Bureau drawing 6-Y-554 as listed in Section A.)
- Class II -- For working pressures from 101 to 200 pounds per square inch, smaller than 2 inch size, threaded ends -- composition.
- Class III -- For working pressures from 101 to 400 pounds per square inch threaded, and flanged ends -- composition.
- Class IV -- For working pressures from 101 to 400 pounds per square inch, sizes 3/4 inch and larger, flanged ends -- cast (or forged) steel.
- Class V -- For working pressures from 401 to 600 pounds per square inch, sizes 3/4 inch and larger, flanged ends -- cast (or forged) steel.
- Class VI -- For working pressures from 601 to 750 pounds per square inch, sizes 3/4 inch and larger, flanged ends -- cast (or forged) steel.

C. MATERIAL AND WORKMANSHIP.

C-1. Departures from Referenced Specifications.-- The use of materials differing from the referenced Navy Department specifications will be considered when it can be clearly demonstrated that an improvement in operating characteristics, or a saving in weight without sacrifice in reliability can be accomplished thereby, or that such substitutes do not preclude the subsequent use of Navy standard materials in effecting repairs or replacements necessitated by service wear. Specific approval shall be obtained where departures are made from the referenced specifications.

C-2. Materials.-- All materials used in the construction of valves shall be as specified in Section E. Alternate materials will be considered in lieu of those specified but their use will only be permitted after the bureau concerned has been satisfied by test or other means that the proposed substitutes fully meet the service requirements.

C-3. Threaded Parts; Standard Bolts, Nuts and Machine Screws.-- Bolts and nuts shall conform to N.D. Specs. 43B11, and 43B14 referred to in Section A.

C-4. Workmanship.-- All castings shall be clean, sound and free from blow holes, porosity, cracks and any other injurious defects. The workmanship shall be first class in all respects.

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D. GENERAL REQUIREMENTS.

D-1. Plans. Plans shall be furnished as required by the bureau concerned.

D-1a. Bureau of Engineering.

D-1a(1). The number, size, arrangement, title, form, etc., shall conform to the requirements of Subsection SL-1, referred to in Section A.

D-1a(2). The specific plans desired and the information thereon shall include the following:

Type A.
Type B.
Type C.

D-1a(3). Type A drawings shall accompany bids.

D-1a(4). The number of sets of Type B and Type D drawings, if required, shall be stated in the requisition, contract or order.

D-2. All valves shall be of the non-rising stem design and so constructed that the stem will not be exposed to the fluid passing through the valve, except that entering the drain hole, when the disk is raised to the full open position.

D-3. All valves when fully open shall permit an unobstructed flow and the area at any point within the valve shall be not less than the inside area of the pipe or tubing to which connected.

D-4. All valves shall be so designed that the valve stem may be packed when the valve is in the full-open position.

D-5. All disks shall be of the wedge-type double-faced design, made in one piece.

D-6. All valves shall be provided with disk guides cast integral with the body.

D-7. Each disk shall have an opening in the bottom to provide drainage.

D-8. Each stem shall be so threaded with acme type threads that the valve will be opened when the handwheel is turned counterclockwise. The end of each stem shall be square and tapered to fit the handwheel. The stem shall be threaded above the tapered section to provide for a hexagonal securing nut.

D-9. The stem and thrust collar shall be one integral piece.

D-10. Unless otherwise specified, each valve 2-1/2 inches and larger shall be provided with an indicator to show whether the valve is open or closed.

D-11. Each valve shall have distinctly cast or stamped on one side of the body the trade mark of the maker, "100" for Class I valves, "200" for Class II valves, "400" for Class III valves, "300" for Class IV valves, "400" for Class V valves, and "600" for Class VI valves; and the size of the valve. Valves for oil shall also have the word 'oil' cast or stamped on the bodies.

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D-12. The walls of bodies and bonnets shall be curved surfaces; no flat surfaces shall be permitted. They shall be ribbed as required to prevent distortion.

D-13. Stuffing boxes shall be separate from the valve bonnets. For valves of 2-1/2 inch size, and above, the glands shall be of the flanged type set up by two nuts working on studs extending through the gland flange.

D-14. All composition gate valves of 2-1/2 inch size and above, and all steel gate valves shall have removable seats. Removable seats shall be screwed into the valve bodies, suitable lugs being provided on the seats for the purpose. The faces of the seats shall be slightly raised at the center to provide a narrow bearing surface not to exceed one-eighth inch in width.

D-15. All gate valves, Classes III, IV, V and VI, 4-1/2 inch size or larger shall be fitted with by-passes. The by-pass valves shall be globe valves, the materials of which shall correspond to the gate valves served. The minimum sizes for the by-passes are given below in Table I.

TABLE I.

: Size of gate valve :	: Size of by-pass valve :
: 4-1/2 inches to 7-1/2 inches, incl. :	: 1/2 inch, minimum :
: 8 inches to 9-1/2 inches, incl. :	: 3/4 inch, minimum :
: 10 inches :	: 1-inch, minimum :

NOTE:- All by-passes shall be connected to their valves by flanged joints.

D-16. Valves stems shall be packed with one of the packings conforming to M.D. Specs. 33P14, 33P16, or 33P17, referred to in Section A.

E. DETAIL REQUIREMENTS.

E-1. Class I Gate Valves.

E-1a. Valves shall conform in every particular to M.D. Specs. 45V1, referred to in Section A, except when ordered in steel, which shall conform to M.D. Specs. 45V1 for design and subparagraph E-4c(1) for materials, but the "bolts" or "studs" and "nuts", shall be steel, M.D. Specs. 43E11, referred to in Section A, Classes B and C, respectively.

E-2. Class II Gate Valves.

E-2a. Valves shall be supplied only with threaded ends and in sizes and with dimensions shown in Table II.

TABLE II.

Size of Pipe for: which Valves are: used :		Dimensions	
		Diameter of handwheel-minimum : mm	Distance centerline to top maxi- : mm
Inches :	Inches :		Inches :
1/4 :	1-1/2 :		4 :
1/2 :	1-3/4 :		4-1/4 :
3/4 :	2-1/2 :		5 :
1 :	2-3/4 :		5-3/4 :
1-1/4 :	3 :		6-1/2 :
1-1/2 :	3-1/2 :		7-1/2 :

E-2b. The threaded ends shall conform to the requirements of N.D. Specs. 44T2, referred to in Section A.

E-2c. Materials shall be the same as those specified for Class I gate valves.

E-2d. Bonnets may be screwed, or flanged and bolted.

E-2e. Handwheels shall be of malleable iron of non-heat design having three or more spokes. See Table II for minimum diameters.

E-3. Class III Gate Valves.

E-3a. Valves shall be supplied with threaded or flanged ends as specified in sizes 1-1/2 inches and smaller; and with flanged ends only in sizes 2 inches and above. The dimensions shall conform to those shown in Table III.

TABLE III.

Size of Pipe :		Dimensions	
or Tubing for: which used :		Flanged Valves	Handwheel
		Diam. of Bore: Face to Face :	Diameter- minimum : to Top-Maximum
Inches :	Inches :	Inches :	Inches :
1/4 :	---	---	1-3/4 :
1/2 :	---	---	2-1/2 :
3/4 :	1 :	5 :	2-3/4 :
1 :	1-1/4 :	5-1/4 :	3 :
1-1/4 :	1-1/2 :	6 :	3-1/2 :
1-1/2 :	2 :	7 :	4 :
2 :	2-1/2 :	7-1/2 :	8 :
2-1/2 :	3 :	8 :	9 :
3 :	3-1/2 :	8-1/2 :	10 :
3-1/2 :	4 :	9 :	11 :
4 :	4-1/2 :	9-1/2 :	11 :
4-1/2 :	5 :	10 :	12 :
5 :	5-1/2 :	10-1/4 :	12 :
5-1/2 :	6 :	10-1/2 :	14 :
6 :	6-1/2 :	10-3/4 :	16 :
6-1/2 :	7 :	11 :	18 :
7 :	7-1/2 :	11-1/4 :	18 :
7-1/2 :	8 :	11-1/2 :	18 :
8 :	8-1/2 :	11-3/4 :	21 :
8-1/2 :	9 :	12 :	21 :
9 :	9-1/2 :	12-1/2 :	21 :
9-1/2 :	10 :	13 :	21 :
10 :	10-1/2 :	13-1/2 :	21 :

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E-3b. The threaded ends shall conform to the requirements of N. D. Specs. 44T2, referred to in Section A.

E-3c. The dimensions of flanges shall conform to Bureau standard B-140, referred to in Section A.

E-3d. Materials shall be the same as those specified for Class I valves.

E-3e. Bonnets for valves 1-1/2 inches and smaller may be screwed. Those for valves 2 inches and larger shall be flanged. Flanged bonnets shall be bolted with bolt studs threaded full length and fitted with a nut on each end.

E-3f. Handwheels for valves, sizes 1-1/2 inches and smaller, shall be of the same type as specified for Class II valves. Handwheels for valves, sizes 2 inches and larger, shall conform to Bureau standard B-64, referred to in Section A, and with diameters not less than those given in Table III.

E-4. Class IV Gate Valves.

E-4a. Valves shall have flanged ends and be supplied only of steel, cast or forged, in all sizes and of dimensions as shown in Table IV.

TABLE IV.

Size of Pipe or Tubing for which used	Diameter of Bore	Face to Face	Dimensions	
			Handwheel: Diameter : Minimum	Height-Centerline to top-maximum
Inches	Inches	Inches	Inches	Inches
3/4	1	5	3-1/4	10
1	1-1/4	5-1/4	4	11
1-1/4	1-1/2	6	5	11-1/2
1-1/2	2	7	6	12-1/2
2	2-1/2	7-1/2	8	13-1/2
2-1/2	3	8	9	15-1/2
3	3-1/2	8-1/2	10	16-1/2
3-1/2	4	9	11	17-1/2
4	4-1/2	9-1/2	11	19
4-1/2	5	10	12	20-1/2
5	5-1/2	10-1/4	12	22
5-1/2	6	10-1/2	14	23-1/2
6	6-1/2	10-3/4	16	25
6-1/2	7	11	18	26-1/2
7	7-1/2	11-1/4	18	28
7-1/2	8	11-1/2	18	29-1/2
8	8-1/2	11-3/4	21	31
8-1/2	9	12	21	32-1/2
9	9-1/2	12-1/2	21	34
9-1/2	10	13	21	35-1/2
10	10-1/2	13-1/2	21	37

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E-4b. The dimension of flanges shall conform to Bureau standard B-141, referred to in Section A.

E-4c. Materials shall be as follows:

(1) Oil Service.

Body, bonnet, stuffing box and gland - Class D cast steel (N.D. Specs. 49S1) or Class B forged steel (N.D. Specs. 49S2).

Disk and seat - CRS-1 corrosion-resisting steel (N.D. Specs. 46S18) or free machining cast corrosion-resisting steel (N.D. Specs. 46S27). The disk may be Class D cast steel (N.D. Specs. 49S1) fitted with seating face of either of the former materials.

Stem - CRS-7 corrosion-resisting steel (N.D. Specs. 46S18).

Stem nut, index unit and scale - brass.

Bolt-studs and nuts - steel, (N.D. Specs. 43B14).

Bolts and nuts - (N.D. Specs. 43B11).

(2) Air, Exhaust Steam or Water Services.

Body, bonnet and stuffing box - same materials as specified for "Oil Service".

Disk and seat - Gun metal (N.E. Specs. 45M6) or special composition of non-galling characteristics as approved.

Stem - nickel-copper alloy, rolled (N.E. Specs. 46M7).

Stuffing box gland, stem nut, index units and scale - brass.

Bolt-studs and nuts - steel (N.D. Specs. 43B14).

Bolt and nuts - (N.D. Specs. 43B11).

E-4d. Bonnets shall be flanged and bolted with bolt studs threaded full length and fitted with a nut on each end.

E-4e. Handwheels shall conform to Bureau standard B-64, referred to in Section A, and with diameters not less than those given in Table IV.

E-5. Class V Gate Valves.

E-5a. Valves shall have flanged ends and be made in all sizes and of the dimensions given in Table V.

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TABLE V.

Size of Pipe or Tubing for which: used	Dimensions				
	Diameter of	Face to face over	Handwheel	Height Center-	
	Bore	raised surface	Diameter Minimum	line to top - maximum	
Inches	Inches	Inches	Inches	Inches	
3/4	3/4	7-1/2	6	8-1/2	
1	1	8-1/2	7	9-1/2	
1-1/4	1-1/4	9	7	11	
1-1/2	1-1/2	9-1/2	8	12-1/2	
2	2	11-1/2	8	15	
2-1/2	2-1/2	13	9	16-5/8	
3	3	14	10	18-1/4	
3-1/2	3-1/2	15	10	19	
4	4	16	12	22	
4-1/2	4-1/2	17	12	24	
5	5	18	14	26	
5-1/2	5-1/2	19	16	27-1/4	
6	6	19-1/2	16	28-1/4	
6-1/2	6-1/2	20-1/2	18	30	
7	7	21-1/2	18	31	
7-1/2	7-1/2	22-1/2	18	33	
8	8	23-1/2	21	35	
8-1/2	8-1/2	24-1/4	21	36	
9	9	25	21	37	
9-1/2	9-1/2	25-3/4	21	38	
10	10	26-1/2	21	39	

E-5b. The dimensions of flanges shall conform to Bureau drawings B-159 and 3-S-530 referred to in Section A. Raised surfaces on all valve flanges shall be 1/4 inch in height.

E-5c. Materials shall be the same as specified for Class IV valves.

E-5d. Bonnets shall be bolted with bolt-studs threaded full length and fitted with a nut on each end.

E-5e. Handwheels shall conform to Bureau standard B-64, referred to in Section A, and with diameters not less than those given in Table V.

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E-6. Class VI Gate Valves.

E-6a. Valves shall have flanged ends and be made in all sizes and of the dimensions given in Table VI.

TABLE VI.

Size of pipe or tubing for which used	Dimensions				
	Diameter of bore	Face to face over raised surface	Handwheel Diameter, minimum	Height centerline to top - maximum	
Inches	Inches	Inches	Inches	Inches	Inches
3/4	3/4	7-1/2	6		10-1/2
1	1	8-1/2	7		11
1-1/4	1-1/4	9	7		11-1/2
1-1/2	1-1/2	9-1/2	8		13
2	2	11-1/2	9		16-1/2
2-1/2	2-1/2	13	9		17
3	3	14	10		19
3-1/2	3-1/2	15-1/2	12		19-1/2
4	4	17	14		24
4-1/2	4-1/2	18-1/2	14		26
5	5	20	15		28
5-1/2	5-1/2	21	18		29
6	6	22	18		30-1/2
6-1/2	6-3/8	23	21		32-1/2
7	6-7/8	24	21		33-1/2
7-1/2	7-3/8	25	21		35-1/2
8	7-7/8	25	24		37-1/2
8-1/2	8-3/8	27-1/4	24		38-1/2
9	8-3/4	28-1/2	24		39-1/2
9-1/2	9-1/4	29-3/4	24		40-1/2
10	9-3/4	31	27		41-1/2

E-6b. The dimensions of flanges shall conform to Bureau drawings B-174 and 3-S-530, referred to in Section A. Raised faces on all valves shall be 1/4-inch in height.

E-6c. Materials shall be the same as specified for Class IV valves.

E-6d. Bonnets shall be bolted with bolt-studs threaded full length and fitted with a nut on each end.

E-6e. Handwheels shall conform to Bureau standard B-64, referred to in Section A, and with diameters not less than those given in Table VI.

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F. METHODS OF SAMPLING, INSPECTION AND TESTS.

F-1. Chemical and physical tests shall be made on samples of material taken during manufacture as required by the specifications covering the various materials used.

F-2. Each valve shall be inspected for defects of workmanship and compliance with specified dimensions.

F-3. Each valve shall be tested as follows:

- (a) By hydrostatic pressure, as tabulated below, for strength and porosity with the gate open.
- (b) By hydrostatic pressure, as tabulated below, for tightness on seat with the gate closed by hand and without the use of a wrench or equivalent, the pressure to be applied alternately on both sides of the gate with the side opposite the pressure open for inspection in each case.

Hydrostatic Test Pressures

	<u>(1) Open</u>	<u>(2) Closed</u>
Class I -----	150 lbs. per sq. in. gage	100 lbs. per sq. in. gage
Class II -----	300 lbs. per sq. in. gage	200 lbs. per sq. in. gage
Class III -----	600 lbs. per sq. in. gage	400 lbs. per sq. in. gage
Class IV -----	750 lbs. per sq. in. gage	400 lbs. per sq. in. gage
Class V -----	1000 lbs. per sq. in. gage	500 lbs. per sq. in. gage
Class VI -----	1500 lbs. per sq. in. gage	750 lbs. per sq. in. gage

F-4. The appliance for the hydrostatic testing of flanged valves shall not restrict longitudinal expansion.

G. PACKAGING, PACKING AND MARKING FOR SHIPMENT.

3-1. Packing.-- Unless otherwise specified, valves shall be delivered in substantial commercial containers so constructed as to insure acceptance by common or other carrier for safe transportation at the lowest rate to the point of delivery.

3-2. Marking.-- Unless otherwise specified, shipping containers shall be marked with the name of the material, the class, size and the quantity contained therein as defined by the contract or order under which shipment is made, the name of the contractor and the number of the contract or order.

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H. NOTES.

H-1. Requisitions and contracts or orders should state the quantity of each class and the size of valves desired and the number of Type B and D drawings desired.

H-2. This specification supersedes Supplementary General Specification for Machinery, SGS(48)-20 formerly issued by the Bureau of Engineering, Navy Department, Washington, D. C.

H-3. Copies of Drawings and Specifications.--

H-3a. Copies of Drawings.-- Copies of Bureau of Engineering drawings may be obtained only upon application to the Bureau of Engineering, Navy Department, Washington, D. C. When requesting, refer to drawings by both title and number.

H-3b. Copies of Bureau of Engineering Specifications.-- Copies of Bureau of Engineering Specifications may be obtained only upon application to the Bureau of Engineering, Navy Department, Washington, D. C. When requesting, refer to Specification by both title and number.

H-3c. Copies of Navy Department Specifications.-- Copies of Navy Department Specifications may be obtained upon application to the Bureau of Supplies and Accounts, Navy Department, Washington, D. C. When requesting, refer to specification by both title and number.

15 January 1938

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BUREAU OF ENGINEERING SPECIFICATION
VALVES, HIGH PRESSURE, GLOBE AND ANGLE, FORGED STEEL, WELDING ENDS,
SIZES, 1/4-INCH TO 1-INCH INCLUSIVE
600 Lbs. W.S.P. and 850°F. Maximum Temperature
(Shipboard Use)

A. APPLICABLE SPECIFICATIONS AND DRAWINGS.

A-1. The following specifications, of the issue in effect on date of invitation for bids, form a part of this specification, and bidders and contractors should provide themselves with the necessary copies.

NAVY DEPARTMENT SPECIFICATIONS

- General Specifications for Inspection of Material, together with Appendix II (Metals).
- 42N2 - Nameplates, instruction plates, and other designating markings for electrical and mechanical equipment (shipboard use).
 - 42S5 - Screws, machine.
 - 43B11 - Bolts, nuts, studs, and tap rivets (and material for same).
 - 43B14 - Bolt studs, steel rods and nuts for service at temperatures up to 850°F.
 - 45V18 - Valves, high pressure, globe and angle, steel (Shipboard use).
 - 46A1 - Aluminum alloy, light castings.
 - 46B6 - Brass, naval, rolled: bars, plates, etc.
 - 46B10 - Brass, naval: castings.
 - 46-I-8 - Iron, malleable: castings.
 - 46M6 - Metal, gun: castings.
 - 46M7 - Nickel-copper alloy, rolled.
 - 46P1 - Plating, cadmium.
 - 46R5 - Rods, welding, cobalt-chromium composition.
 - 46S18 - Steel, corrosion-resisting; bars, rods and forgings (except for reforging)
 - 46S33 - Steel castings, molybdenum alloy (for temperatures up to 850°F.).
 - 46S34 - Steel forgings, molybdenum alloy (for temperatures up to 850°F.).
 - 49S1 - Steel: castings.
 - 49S2 - Steel: forgings for hulls, engines, ordnance.

BUREAU OF ENGINEERING SPECIFICATIONS

General Specifications for Machinery, Subsection S1-1.

A-2. The following Bureau of Engineering drawings, of the latest alteration in effect on date of invitation for bids, form a part of this specification, and bidders and contractors should provide themselves with the necessary copies:

- B-64 - Handwheels for valves.
- B-100 - Finish marks.
- B-147 - Seamless drawn steel tubing.
- B-153 - Standard application of annual contract packing.
- 3-S-530 - Forged steel welding end fittings.

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B. TYPE.

B-1. Valves covered by this specification shall be furnished in but one type.

C. MATERIAL AND WORKMANSHIP.

C-1. Departures from Referenced Specifications.-- The use of materials differing from the referenced Navy Department specifications will be considered when it can be clearly demonstrated that an improvement in operating characteristics, or a saving in weight without sacrifice in reliability can be accomplished thereby, or that such substitutes do not preclude the subsequent use of Navy standard materials in effecting repairs or replacements necessitated by service wear. Specific approval shall be obtained where departures are made from the referenced specifications.

C-2. Materials.-- All materials used in the construction of valves shall be as specified in Section E. Alternate materials will be considered in lieu of those specified but their use will only be permitted after the Bureau has been satisfied by test or other means that the proposed substitutes fully meet the service requirements.

C-3. Threaded Parts; Standard Bolts, Nuts and Machine Screws.-- Bolts and nuts shall conform to R.D. Specs. 43B11 or 43B14, referred to in Section A, as applicable. All threaded parts shall be assembled with the use of a suitable high temperature thread lubricant satisfactory to the Bureau.

C-4. Workmanship.-- All parts shall be free from flaws, burrs, and blemishes. The workmanship shall be first class in every respect.

D. GENERAL REQUIREMENTS.

D-1. (See Section E).

E. DETAIL REQUIREMENTS.

E-1. Plans.-- Plans shall be furnished as required by the bureau concerned.

E-1a. Bureau of Engineering.

E-1a(1). The number, size, arrangement, title, form, etc., shall conform to the requirements of Subsection S1-1, referred to in Section A.

E-1a(3). The specific plans desired, except as provided by subparagraphs E-1a(3) and E-1a(4), shall include the following:

Type A.
Type B.
Type D.

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E-1a(3). Type A drawings shall accompany bids, except when the bidder has filed with the Bureau approved drawings of the valves, in which case it will suffice to quote the Bureau file numbers of the drawings for identification that the valves have been approved by the Bureau and meet these specifications.

E-1a(4). Type B and Type D drawings will not be required provided the contractor has filed with the Bureau approved drawings of the valves.

E-2. The materials shall conform to the following:

- (a) Body and bonnet.- Class A forged carbon-molybdenum steel (N.D. Specs. 46S34).
- (b) Bonnet bolt-studs and nuts.- Steel (N.D. Spec. 43B14).
- (c) Bonnet yoke bushing.- Gun metal (N.D. Spec. 46M6).
- (d) Bonnet gasket.- Soft steel or iron sheet; nickel-copper alloy sheet, (N.D. Spec. 46M7), dead soft annealed; or copper-nickel zinc sheet of approximately 64 percent copper, 30 percent nickel and 6 percent zinc. Brinell 80 or less for all.
- (e) Disk.- Cast carbon-molybdenum steel, (N.D. Spec. 46S33) or forged carbon-molybdenum steel (N.D. Spec. 46S34); (see item g for seating face).
- (f) Disk nut.- Forged steel, Class C (N.D. Spec. 49S2).
- (g) Disk and seat, seating faces.- Cobalt-chromium composition (N.D. Spec. 46R5).
- (h) Flange bolt - studs and nuts.- (Bureau Standard Sheet B-174).
- (i) Gland, stuffing box.- Class C cast or forged steel (electro-galvanized) (N.D. Spec. 49S1 or 49S2).
- (j) Gland bolts.- Steel, Class B (N.D. Spec. 43B11), cadmium plated (N.D. Spec. 46P1); nuts - steel, Class C (N.D. Spec. 43B11), cadmium plated (N.D. Spec. 46P1); or Naval brass (N.D. Spec. 46B6).
- (k) Handwheels.- See Bureau Standard Sheet B-64.
- (l) Lock washer for disk nut.- Corrosion-resisting steel, Grade 1, (N.D. Spec. 47S20).
- (m) Set screws and split pins.- Steel.
- (n) Stem bushing.- Special nickel-copper alloy, 52 to 56 percent nickel, 30.5 to 34 percent copper, 10.5 to 13 percent tin, 0.35 to 1 percent silicon, 0.30 to 0.75 percent manganese, 0.40 to 1 percent phosphorous, and 1 to 2 percent iron. Minimum tensile strength 60,000 pounds per square inch. Brinell 190 to 235. Other materials satisfactory for the service will be given consideration.
- (o) Stem for disk.- Forged corrosion-resisting steel, grade 7, (N.D. Spec. 46S18).
- (p) Stem nuts.- Naval brass (N.D. Spec. 46B6).
- (q) Washer between end of rotating stem and disk.- Nitralloy or equivalent, at least 800 Brinell hardness.
- (r) T-handles.- Naval brass (N.D. Spec. 46B1C), or malleable iron (N.D. Spec. 46-I-8).

E-3. Valves shall be so designed as to insure positive tightness under severe service.

E-4. The bodies of all valves shall be so fitted that the valves may be easily ground in.

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E-5. The characteristic dimensions of all valves shall be as given in Figure 1.

E-6. Bodies and bonnets shall be forged.

E-7. The unrestricted area through the seats, with the disk in the full open position, and through all body passages, shall be not less than that given in column "B" of the table shown on Figure 1.

E-8. Valves shall have bolted bonnets. The joint faces for bonnet flanges shall be male and female and shall have (F2) finish; see Bureau Standard Sheet B-100, referred to in Section A. The bonnets shall be secured by studs or bolt-studs.

E-9. Yokes shall be integral with the bonnets, but a design with separate yoke will be given consideration. The yoke shall be fitted with a bushing threaded to suit the stem.

E-10. Stems shall have outside Acme type of threads unless otherwise approved, and shall turn right-hand to close the valves.

E-11. Valve disks shall be of the plug type with swivel attachment to the stems and the seating area faced with cobalt-chromium composition not less than 3/32-inch thick for 1-inch and 3/4-inch valves, and 1/16-inch thick for valves 1/2-inch and smaller; the composition to be deposited by welding to insure positive bond between it and the disk. Disks shall be secured to the stems by nuts locked in place; other means for securing disks for 1/4-inch and 3/8-inch valves will be considered if the method is described in the bid. A hardened washer shall be inserted between the end of all stems and disks for valves 3/4-inch and larger to prevent galling.

E-12. Valve seats shall be integral with the bodies. The seating area shall be faced with cobalt-chromium composition in compliance with similar requirements for the disks; see paragraph E-11. The included seat angle shall be 30 to 60 degrees.

E-13. Stuffing boxes shall be of ample depth for at least six turns of packing, except 1/4-inch valves which shall have at least four turns. Stuffing boxes shall be arranged so that they can be packed when under pressure with the valve open. Valves shall be delivered with stuffing boxes suitably packed. The packing shall be as approved; see Bureau Standard Sheet B-153, referred to in Section A. Stuffing box glands shall be secured and adjusted by studs, and nuts.

E-14. Handwheels.-- Handwheels shall conform to Bureau Standard Sheet B-64, referred to in Section A. The minimum diameters shall be as given in the table shown on Figure 1. All handwheels shall have the rims and the upper face of hubs finished and buffed and the spokes and unfinished portion of the hubs wire brushed, unless required to be finished and buffed all over. All handwheels shall be secured by means of a hexagonal nut threaded to the stem. T-handles may be used instead of handwheels for 1/4-inch and 3/8-inch valves.

E-15. Each valve shall have distinctly stamped, or equivalent, on one side of the body, the "size", "R.P.", "600", and in the case of globe valves, the position of the seat, for identification. The manufacturers trade mark may also appear on the body. When space does not permit this, the marking shall be as directed.

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F. METHODS OF SAMPLING, INSPECTION AND TESTS.

F-1. Chemical and physical tests shall be made as required by the specifications covering the various materials used.

F-2. Five percent of the initial quantity of valves on order for any new design shall be selected by the Naval Inspector and tested to a steam pressure of 800 pounds per square inch gage, at a temperature of 850°F. Such test shall include tests for tightness on both sides of the disk, and tightness of the body. On subsequent cumulative orders, on the same manufacturer for valves of the same design a total of five percent of each size of valve so ordered shall be given the above steam test. This shall be interpreted to mean that of each one hundred valves of the same size and design ordered, the Inspector may select at his discretion five valves to be steam tested. Valves so selected may be taken from one order or from a multiplicity of orders totalling one hundred valves as desired, the number tested being a percentage of the total runs of valves and not a percentage of each individual order.

F-3. All valves shall be tested as follows:

- (a) By hydrostatic pressure to at least 1500 pounds per square inch for strength and porosity with the disk open.
- (b) By hydrostatic pressure to at least 750 pounds per square inch for tightness on seat with the disk closed by hand and without the use of a wrench or equivalent, the pressure shall be applied alternately on both sides of the disk with the side opposite the pressure open for inspection in each case.
- (c) By air pressure to approximately 100 pounds per square inch for porosity and tightness on seat, procedure to be as outlined in (b) above.

G. PACKAGING, PACKING, AND MARKING FOR SHIPMENT.

G-1. Packing.-- Unless otherwise specified, the subject commodity shall be delivered in substantial wooden crates or boxes, so constructed as to insure safe delivery by common or other carrier to the point of delivery. Not more than five valves shall be packed in a container. The valves shall be packed rigidly, or secured in the containers in such a manner as will prevent damage from shifting while being handled or transported. Sets of spare parts, if furnished, shall be packaged or bagged, and secured to the valve to which they belong.

G-2. Marking.-- Unless otherwise specified, shipping containers shall be marked with the name of the material, the type, size, and the quantity contained therein as defined by the contract or order under which the shipment is made, the name of the contractor, and the number of the contract or order, and the net and gross weight.

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H. NOTES.

H-1. Requisitions and contracts or orders should state the number of Type B and D drawings desired. See subparagraphs E-1a(3) and E-1a(4).

H-2. This specification supersedes Supplementary General Specification for Machinery, SGS(48)-155 formerly issued by the Bureau of Engineering, Navy Department, Washington, D.C.

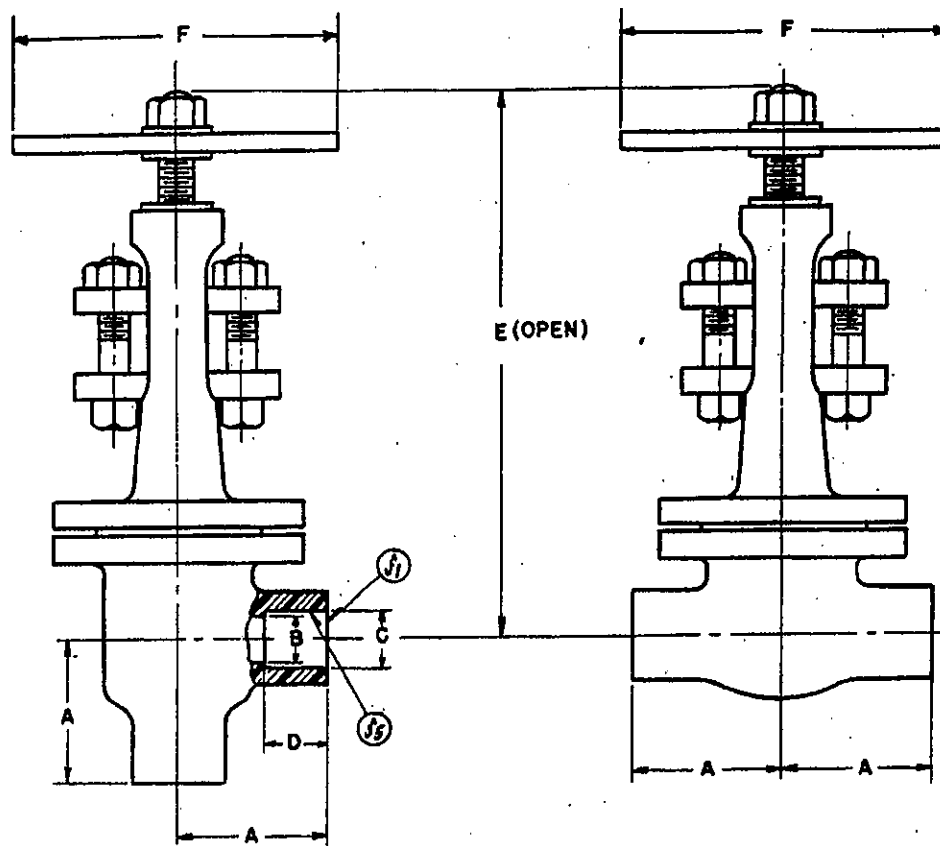
H-3. Copies of Drawings and Specifications.

H-3a. Copies of Drawings.- Copies of Bureau of Engineering drawings may be obtained only upon application to the Bureau of Engineering, Navy Department, Washington, D.C. When requesting, refer to drawings by both title and number.

H-3b. Copies of Bureau of Engineering Specifications.- Copies of Bureau of Engineering specifications may be obtained only upon application to the Bureau of Engineering, Navy Department, Washington, D.C. When requesting, refer to specification by both title and number.

H-3c. Copies of Navy Department Specifications.- Copies of Navy Department specifications may be obtained upon application to the Bureau of Supplies and Accounts, Navy Department, Washington, D.C., except that naval activities should make application to the Commandant, Navy Yard, New York, N.Y. When requesting, refer to specification by both title and number.

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ALL DIMENSIONS IN INCHES							
SIZE	A	B	C	D	E		F
					GLOBE	ANGLE	
$\frac{1}{4}$	2	$\frac{5}{16}$.55	$\frac{7}{16}$	6	$5\frac{5}{8}$	*3
$\frac{3}{8}$	$2\frac{1}{8}$	$\frac{7}{16}$.685	$\frac{9}{16}$	$6\frac{1}{4}$	$5\frac{7}{8}$	*4
$\frac{1}{2}$	$2\frac{5}{16}$	$\frac{19}{32}$	.855	$\frac{5}{8}$	$7\frac{3}{8}$	$6\frac{3}{4}$	5
$\frac{3}{4}$	$2\frac{7}{8}$	$\frac{3}{16}$	1.07	$\frac{11}{16}$	$9\frac{1}{8}$	$8\frac{1}{8}$	6
1	$3\frac{1}{2}$	$\frac{1}{16}$	1.335	$\frac{3}{4}$	11	$9\frac{5}{8}$	7

*MINIMUM LENGTH OF TEE HANDLES $2\frac{1}{2}$ INCHES AND 4 INCHES, RESPECTIVELY.

FIG. 1

10 November 1937

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BUREAU OF ENGINEERING SPECIFICATION

VALVES, HIGH PRESSURE, GLOBE AND ANGLE, FORGED STEEL, WELDING ENDS,

SIZES, 1/4-INCH TO 1-INCH INCLUSIVE

600 Lbs. W.S.P. and 850° F. Maximum Temperature

(SHIPBOARD USE)

A. APPLICABLE SPECIFICATIONS AND DRAWINGS.

A-1. The following specifications, of the issue in effect on date of invitation for bids, form a part of this specification, and bidders and contractors should provide themselves with the necessary copies.

NAVY DEPARTMENT SPECIFICATIONS

General Specifications for Inspection of Material, together with
Appendix II (Metals).

- 42S5 - Screws, machine.
- 43B11 - Bolts, nuts, studs and tap rivets (and material for same).
- 43B14 - Bolt studs, steel rods and nuts for service at temperatures up to 850° F.
- 45V18 - Valves, high pressure, globe and angle, steel (Shipboard use).
- 46A1 - aluminum alloy, light castings.
- 46B6 - Brass, naval, rolled: Bars, plates, etc.
- 46B10 - Brass, naval: Castings.
- 46-I-8 - Iron, malleable: Castings.
- 46M6 - Metal, gun: Castings.
- 46M7 - Nickel-copper alloy, rolled.
- 46P1 - Plating, cadmium.
- 46R5 - Rods, welding, cobalt-chromium composition.
- 46S18 - Steel, corrosion-resisting; bars, rods and forgings (except for reforging)
- 46S33 - Steel castings, molybdenum alloy (for temperatures up to 850° F.).
- 46S34 - Steel forgings, molybdenum alloy (for temperatures up to 850° F.).
- 49S1 - Steel: Castings.
- 49S2 - Steel: Forgings for hulls, engines, and ordnance.

BUREAU OF ENGINEERING SPECIFICATIONS

General Specifications for Machinery, Subsection S1-1.

A-2. The following Bureau of engineering drawings, of the latest alteration in effect on date of invitation for bids, form a part of this specification, and bidders and contractors should provide themselves with the necessary copies:

- B-64 - Handwheels for valves.
- B-100- Finish marks.
- B-147- Seamless drawn steel tubing.
- B-153- Standard application of annual contract packing.
- 3-S-530- Forged steel welding end fittings.

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B. TYPE.

B-1. Valves covered by this specification shall be furnished in but one type.

C. MATERIAL AND WORKMANSHIP.

C-1. Departures from Referenced Specifications.- The use of materials differing from the referenced Navy Department specifications will be considered when it can be clearly demonstrated that an improvement in operating characteristics, or a saving in weight without sacrifice in reliability can be accomplished thereby, or that such substitutes do not preclude the subsequent use of Navy standard materials in effecting repairs or replacements necessitated by service wear. Specific approval shall be obtained where departures are made from the referenced specifications.

C-2. Materials.- All materials used in the construction of valves shall be as specified in Section E. Alternate materials will be considered in lieu of those specified but their use will only be permitted after the Bureau has been satisfied by test or other means that the proposed substitutes fully meet the service requirements.

C-3. Threaded Parts; Standard Bolts, Nuts and Machine Screws.- Bolts and nuts shall conform to U.D. Specs. 43B11 or 43B14, referred to in Section A, as applicable. All threaded parts shall be assembled with the use of a suitable high temperature thread lubricant satisfactory to the Bureau.

C-4. Workmanship.- All parts shall be free from flaws, burrs, and blemishes. The workmanship shall be first class in every respect.

D. GENERAL REQUIREMENTS.

D-1. (See Section E).

E. DETAIL REQUIREMENTS.

E-1. Plans.- Plans shall be furnished as required by the bureau concerned.

E-1a. Bureau of Engineering.

E-1a(1). The number, size, arrangement, title, form, etc., shall conform to the requirements of Subsection SI-1, referred to in Section A.

E-1a(2). The specific plans desired, except as provided by subparagraphs E-1a(3) and E-1a(4), shall include the following:

Type A.
Type B.
Type E.

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E-1a(3). Type A drawings shall accompany bids, except when the bidder has filed with the Bureau approved drawings of the valves, in which case it will suffice to quote the Bureau file numbers of the drawings for identification that the valves have been approved by the Bureau and meet these specifications.

E-1a(4). Type B and Type D drawings will not be required provided the contractor has filed with the Bureau approved drawings of the valves.

E-2. The materials shall conform to the following:

- (a) Body and bonnet.- Class A forged carbon-molybdenum steel (N.D. Specs. 46S34).
- (b) Bonnet bolt-studs and nuts.- Steel (N.D. Spec. 43B14).
- (c) Bonnet yoke bushing.- Gun metal (N.D. Spec. 46M6).
- (d) Bonnet gasket.- Soft steel or iron sheet; nickel-copper alloy sheet, (N.D. Spec. 46M7), dead soft annealed; or copper-nickel zinc sheet of approximately 64 percent copper, 50 percent nickel and 6 percent zinc. Brinell 80 or less for all.
- (e) Disk.- Cast carbon-molybdenum steel, (N.D. Spec. 46S33) or forged carbon-molybdenum steel (N.D. Spec. 46S34); (see item 7 for seating face).
- (f) Disk nut.- Forged steel, Class C (N.D. Spec. 49S2).
- (g) Disk and seat, seating faces.- Cobalt-chromium composition (N.D. Spec. 46R5).
- (h) Flange bolt - studs and nuts.- (Bureau Standard Sheet E-174).
- (i) Gland, stuffing box.- Class C cast or forged steel (electro-galvanized) (N.D. Spec. 49S1).
- (j) Gland bolts.- Steel, Class E (N.D. Spec. 43B11), cadmium plated (N.D. Spec. 46P1); nuts - steel, Class C (N.D. Spec. 43B11), cadmium plated (N.D. Spec. 46P1); or Naval brass (N.D. Spec. 46B6).
- (k) Handwheels.- See Bureau Standard Sheet E-64.
- (l) Lock washer for disk nut.- Corrosion-resisting steel, Grade 1, (N.D. Spec. 46S18).
- (m) Set screws and split pins.- Steel.
- (n) Stem bushing.- Special nickel-copper alloy, 52 to 56 percent nickel, 30.5 to 34 percent copper, 10.5 to 13 percent tin, 0.35 to 1 percent silicon, 0.30 to 0.75 percent manganese, 0.40 to 1 percent phosphorous and 1 to 2 percent iron. Minimum tensile strength 60,000 pounds per square inch. Brinell 190 to 235. Other materials satisfactory for the service will be given consideration.
- (o) Stem for disk.- Forged corrosion-resisting steel, grade 7, (N.D. Spec. 46S18).
- (p) Stem nuts.- Naval brass (N.D. Spec. 46B6).
- (q) Washer between end of rotating stem and disk.- Nitralloy or equivalent, at least 80C Brinell hardness.
- (r) T-handles.- Naval brass (N.D. Spec. 46B10), or malleable iron (N.D. Spec. 46-I-8).

E-3. Valves shall be so designed as to insure positive tightness under severe service.

E-4. The bodies of all valves shall be so fitted that the valves may be easily ground in.

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E-5. The characteristic dimensions of all valves shall be as given in Figure 1.

E-6. Bodies and bonnets shall be forged.

E-7. The unrestricted area through the seats, with the disk in the full open position, and through all body passages, shall be not less than that given in column "B" of the table shown on Figure 1.

E-8. Valves shall have bolted bonnets. The joint faces for bonnet flanges shall be male and female and shall have (f3) finish; see Bureau Standard Sheet B-100, referred to in Section A. The bonnets shall be secured by studs or bolt-studs.

E-9. Yokes shall be integral with the bonnets, but a design with separate yoke will be given consideration. The yoke shall be fitted with a bushing threaded to suit the stem.

E-10. Stems shall have outside acme type of threads unless otherwise approved, and shall turn right-hand to close the valves.

E-11. Valve disks shall be of the plug type with swivel attachment to the stems and the seating area faced with cobalt-chromium composition not less than 3/32-inch thick for 1-inch and 3/4-inch valves, and 1/16 inch thick for valves 1/2-inch and smaller; the composition to be deposited by welding to insure positive bond between it and the disk. Disks shall be secured to the stems by nuts locked in place; other means for securing disks for 1/4-inch and 3/8-inch valves will be considered if the method is described in the bid. A hardened washer shall be inserted between the end of all stems and disks for valves 3/4-inch and larger to prevent galling.

E-12. Valve seats shall be integral with the bodies. The seating area shall be faced with cobalt chromium composition in compliance with similar requirements for the disks; see paragraph E-11. The included seat angle shall be 30 to 60 degrees.

E-13. Stuffing boxes shall be of ample depth for at least six turns of packing, except 1/4-inch valves which shall have at least four turns. Stuffing boxes shall be arranged so that they can be packed when under pressure with the valve open. Valves shall be delivered with stuffing boxes suitably packed. The packing shall be as approved; see Bureau Standard Sheet B-153, referred to in Section A. Stuffing box glands shall be secured and adjusted by studs, and nuts.

E-14. Handwheels.— Handwheels shall conform to Bureau Standard Sheet B-64, referred to in Section A. The minimum diameters shall be as given in the table shown on Figure 1. All handwheels shall have the rims and the upper face of hubs finished and buffed and the spokes and unfinished portion of the hubs wire brushed, unless required to be finished and buffed all over. All handwheels shall be secured by means of a hexagonal nut threaded to the stem. T-handles may be used instead of handwheels for 1/4-inch and 3/8-inch valves.

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F. METHODS OF SAMPLING, INSPECTION AND TESTS.

F-1. Chemical and physical tests shall be made as required by the specifications covering the various materials used.

F-2. Five percent of the initial quantity of valves on order for any new design shall be selected by the Naval Inspector and tested to a steam pressure of 600 pounds per square inch gage, at a temperature of 850°F. Such test shall include tests for tightness on both sides of the disk, and tightness of the body. On subsequent cumulative orders, on the same manufacturer for valves of the same design a total of five percent of each size of valve so ordered shall be given the above steam test. This shall be interpreted to mean that of each one hundred valves of the same size and design ordered, the Inspector may select at his discretion five valves to be steam tested. Valves so selected may be taken from one order or from a multiplicity of orders totalling one hundred valves as desired, the number tested being a percentage of the total runs of valves and not a percentage of each individual order.

F-3. All valves shall be tested as follows:

- (a) By hydrostatic pressure to at least 1500 pounds per square inch for strength and porosity with the disk open.
- (b) By hydrostatic pressure to at least 750 pounds per square inch for tightness on seat with the disk closed by hand and without the use of a wrench or equivalent, the pressure shall be applied alternately on both sides of the disk with the side opposite the pressure open for inspection in each case.
- (c) By air pressure to approximately 100 pounds per square inch for porosity and tightness on seat, procedure to be as outlined in (b) above.

G. PACKAGING, PACKING, AND MARKING FOR SHIPMENT.

G-1. Packing.-- Unless otherwise specified, the subject commodity shall be delivered in substantial wooden crates or boxes, so constructed as to insure safe delivery by common or other carrier to the point of delivery. Not more than five valves shall be packed in a container. The valves shall be packed rigidly, or secured in the containers in such a manner as will prevent damage from shifting while being handled or transported. Sets of spare parts, if furnished, shall be packaged or bagged, and secured to the valve to which they belong.

G-2. Marking.-- Unless otherwise specified, shipping containers shall be marked with the name of the material, the type, size, and the quantity contained therein as defined by the contract or order under which the shipment is made, the name of the contractor, and the number of the contract or order, and the net and gross weight.

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H. NOTES.

H-1. Requisitions and contracts or orders should state the number of Type B and D drawings desired. See subparagraphs E-1a(3) and E-1a(4).

H-2. This specification supersedes Supplementary General Specification for Machinery, SGS(48)-155 formerly issued by the Bureau of Engineering, Navy Department, Washington, D.C.

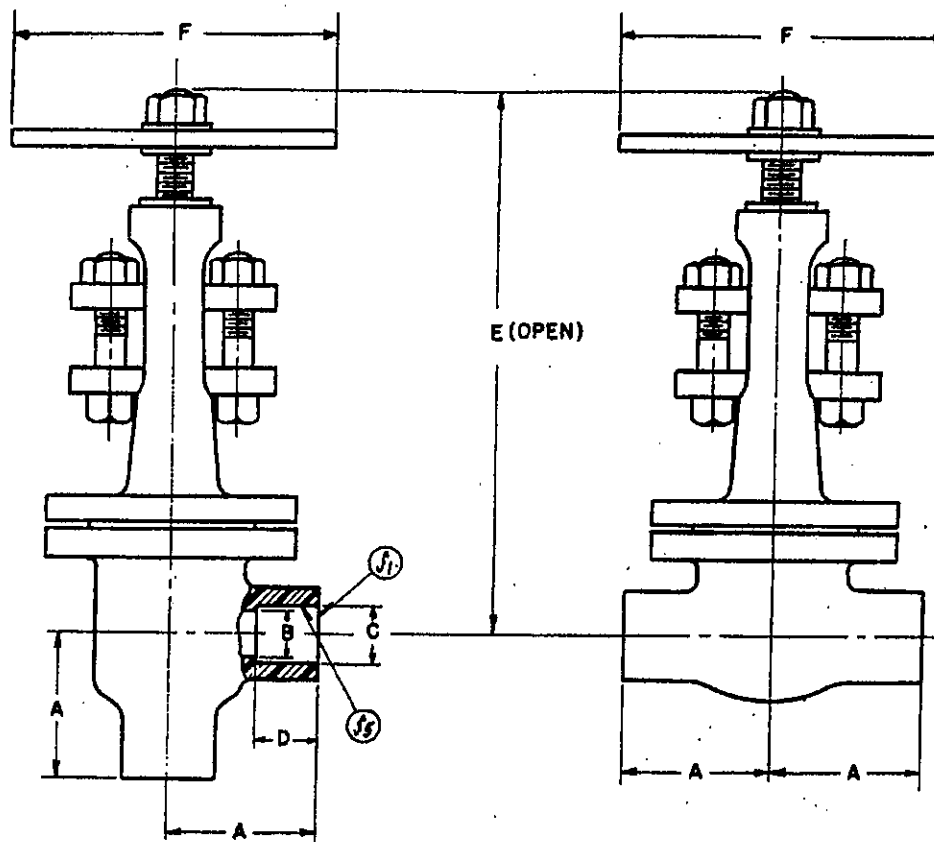
H-3. Copies of Drawings and Specifications.

H-3a. Copies of Drawings.- Copies of Bureau of Engineering drawings may be obtained only upon application to the Bureau of Engineering, Navy Department, Washington, D.C. When requesting, refer to drawings by both title and number.

H-3b. Copies of Bureau of Engineering Specifications.- Copies of Bureau of Engineering specifications may be obtained only upon application to the Bureau of Engineering, Navy Department, Washington, D.C. When requesting, refer to specification by both title and number.

H-3c. Copies of Navy Department Specifications.- Copies of Navy Department specifications may be obtained upon application to the Bureau of Supplies and Accounts, Navy Department, Washington, D.C., except that naval activities should make application to the Commandant, Navy Yard, New York, N.Y. When requesting, refer to specification by both title and number.

45 V/9.



ALL DIMENSIONS IN INCHES							
SIZE	A	B	C	D	E		F
					GLOBE	ANGLE	
$\frac{1}{4}$	2	$\frac{5}{16}$	.55	$\frac{7}{16}$	6	$5\frac{5}{8}$	*3
$\frac{3}{8}$	$2\frac{1}{8}$	$\frac{7}{16}$	.685	$\frac{9}{16}$	$6\frac{1}{4}$	$5\frac{7}{8}$	*4
$\frac{1}{2}$	$2\frac{5}{16}$	$\frac{9}{32}$	.855	$\frac{5}{8}$	$7\frac{3}{8}$	$6\frac{3}{4}$	5
$\frac{3}{4}$	$2\frac{7}{8}$	$\frac{13}{16}$	1.07	$\frac{11}{16}$	$9\frac{1}{8}$	$8\frac{1}{8}$	6
1	$3\frac{1}{2}$	$\frac{17}{16}$	1.335	$\frac{3}{4}$	11	$9\frac{5}{8}$	7

*MINIMUM LENGTH OF TEE HANDLES $2\frac{1}{2}$ INCHES AND 4 INCHES, RESPECTIVELY.

FIG. 1

Exhibit B

MIL-V-220520(EN)
20 March 1978
~~SUPERSEDED~~
MIL-V-220520(SHIPS)
11 April 1961
(See 4.5)

MILITARY SPECIFICATION

VALVES, STOP AND STOP CHECK, GLOBE, ANGLE, AND Y PATTERN, CAST OR
FORGED CARBON OR ALLOY STEEL, OUTSIDE SCREW AND Yoke
(SIZE 1-1/2 INCHES AND LARGER)

This specification is approved for use by the Naval Sea Systems Command and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers steel globe, angle, and Y pattern valves in sizes 2-1/2 inches and larger.

1.2 Classification. Valves shall be classified in accordance with the composition and rating (see 1.2.1 and 1.2.2), as specified (see 4.2.1).

1.2.1 Composition. Valves shall be of the following compositions:

Composition A:
Chromium - 2-1/4 percent.
Molybdenum - 1 percent.
Composition B:
Chromium - 1-1/4 percent.
Molybdenum - 1/2 percent.
Composition C:
Carbon steel.

1.2.2 Rating. Valves shall be rated as standard (150, 300, or 600 class), and as special (600, 900, 1500, or 2500 class) in accordance with ANSI B16.34.

2. APPLICABLE DOCUMENTS

2.1 Issues of documents. The following documents, of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein.

SPECIFICATIONS

FEDERAL

HK-P-46 - Packing; Asbestos, Sheet, Compressed.

MILITARY

MIL-V-3 - Valves, Fittings, and Flanges (Except for Systems Indicated Marine); Packaging of.

MIL-R-196 - Repair Parts for Internal Combustion Engines, Packaging of.

MIL-E-901 - Shock Tests, H.I. (High-Impact); Shipboard Machinery, Equipment and Systems, Requirements for.

MIL-F-1341 - Fittings, Lubrication.

MIL-A-7621 - Asbestos Sheet, Compressed, for Fuel, Lubricant, Coolant, Water, and High Temperature Resistant Gaskets.

MIL-R-17131 - Rods and Powders, Welding, Surfacing.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Ship Engineering Center, SEC 8174, Department of the Navy, Washington, DC 20362 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

MIL-V-220520(ISH)

MILITARY (Continued)

- MIL-P-17103 - Packing Materials, Plastic Metallic and Plastic Nonmetallic.
- MIL-G-21032 - Gaskets, Metallic-Asbestos, Spiral Wound.
- MIL-V-22094 - Valves, Globe, Y-Pattern Globe, Stop Check, Angle, Flanged Bonnet, Manually Operated Nominal Pipe Size (NPS), 2 inches and Less.
- MIL-P-24377 - Packing Material, Asbestos, Braided, Impregnated With TFE (Polytetrafluoroethylene), Surface Lubricated.

STANDARDS

MILITARY

- MIL-STD-167-1 - Mechanical Vibrations of Shipboard Equipment (Type I - Environmental and Type II - Internally Excited).
- MIL-STD-271 - Nondestructive Testing Requirements for Metals.
- MIL-STD-278 - Fabrication Welding and Inspection and Casting Inspection and Repair for Machinery, Piping and Pressure Vessels in Ships of the United States Navy.
- MIL-STD-750 - Nondestructive Testing, Welding, Quality Control, Material Control and Identification and HI-Shock Test Requirements for Piping System Components for Naval Shipboard Use.
- MIL-STD-1552 - Provisioning Technical Documentation, Uniform DOD Requirements for.
- MIL-STD-1561 - Provisioning Procedures, Uniform DOD.
- MS15003 - Fittings, Lubrication (Hydraulic), Surface Check, 1/8 Pipe Threads.

DRAWINGS

MILITARY

- NAVSHIPS 5000-84824-1385620 - Handwheels for Valves.
- NAVSEA 801-3001021 - Pressure Seal Ring-Standard and Oversize-Valve Pressure Class 600-1500.

(Copies of specifications, standards, drawings, and publications required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

- B16.10 - Face-to-Face and End-to-End Dimensions of Ferrous Valves.
- B16.34 - Steel Butt-Welding End Valves.

(Application for copies should be addressed to the American National Standards Institute, 1430 Broadway, New York, New York 10018.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- A105 - Forgings, Carbon Steel, for Piping Components.
- A106 - Seamless Carbon Steel Pipe for High-Temperature Service.
- A182 - Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service.
- A193 - Alloy-Steel and Stainless Steel, Bolting Materials for High-Temperature Service.
- A194 - Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service.
- A216 - Carbon-Steel Castings Suitable for Fusion Welding for High-Temperature Service.
- A217 - Martensitic Stainless Steel and Alloy Steel Castings for Pressure-Containing Parts Suitable for High-Temperature Service.
- A335 - Seamless Ferritic Alloy Steel Pipe for High-Temperature Service.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.)

(Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

MIL-V-22032D(3H)

3. REQUIREMENTS

3.1 Qualification. Valves with a 600, 900, 1500, or 2500 special class rating, furnished under this specification shall be products which are qualified for listing on the applicable qualified products list at the time set for opening of bids (see 4.3 and 4.3).

3.2 Materials. Materials shall be as specified in table I. Materials for parts other than those listed in table I shall be selected so as to prevent galling, seizing, or excessive wear of operating parts. Cast iron and aluminum shall be used only for those parts where permitted in this specification. Magnesium alloys shall not be used. Clearances shall be adequate to prevent interferences due to thermal expansion.

TABLE I. List of materials.

Name of parts	Materials form	Composition A	Composition B	Composition D
		Applicable documents		
Body, bonnet	Forgings or castings	ASTM A182, grade F22 ASTM A217, grade WC9	ASTM A182, grade F11 ASTM A217, grade WC6	ASTM A105, ASTM A16, grade WC3 ^{1/}
Retaining ring and yoke	Forgings or castings	ASTM A182, grades F22 or F11 ASTM A105 ASTM A217, grades WC9 or WC6 ASTM A216, grade WC3		
Studs for bonnets	Alloy steel for high temperature bolting	ASTM A193, grade B16	ASTM A193, grade B16	ASTM A193, grades B7 and B16
Nuts for bonnets	Heavy semi-finished hexagon carbon and alloy steel for high temperature bolting	ASTM A194, grade 4	ASTM A194, grade 4	ASTM A194, grades 2H and 4
Standard pressure seal rings and standard oversized pressure seal rings ^{2/}	Soft carbon steel, silver-plated	Commercial		
Gaskets (for flanged bonnets)	Spiral wound	MIL-G-21032, type 1, class A or B		
	Compressed asbestos sheet	MIL-A-7021 (where fuel resistance is necessary) HM-P-46, class 1 (except where fuel resistance is necessary)		
Packing	Asbestos impregnated with polytetrafluoroethylene	MIL-P-74377 (nonlubricated) service temperature not to exceed that of saturated steam MIL-P-74377, superheated steam total temperature in excess of 550°F		
	Plastic, metallic or nonmetallic	MIL-P-17303, symbol III for temperatures above 500°F		
Nuts, bolts, washers, bushings, liners	Materials used in the construction of these parts other than specified above shall be in accordance with the material specifications shown on the manufacturer's drawings (see 3.4.1)			
Valve trim	(See table IV)			

^{1/} Bonnet material for composition D valves may also be grade WC6 of ASTM A217.

^{2/} Oversized seal rings may be used in the repair of pressure seal bonnets, (i.e.) as shown on Drawing 803-5001031.

MIL-V-23052D(6N)

3.3 Design. Unless otherwise specified herein, valves, valve parts, and design features and parameters shall conform to ANSI B16.34.

3.3.1 Pressure-temperature ratings. The design and pressure-temperature rating shall be in accordance with ANSI B16.34, except the maximum allowable temperature for composition D shall be 775°F. Pressure seal valves shall be designed in such a manner as to permit repair by the use of oversize seal rings. The detail design of the oversize seal ring shall be as shown on Drawing 803-3001021.

3.3.2 End connections. Valve end connections shall withstand the forces and moments imposed by the connecting pipe to which they are attached. For design purposes, the maximum value of the fiber stress in the connecting pipe produced by these forces and moments shall be considered to be equal to 8.2 percent offset yield stress of the piping material at room temperature.

3.3.3 End preparation. Design of welding ends and flange facing shall be as specified (see 6.2.1).

3.3.4 Drains and by-passes. Drains and by-passes shall be in accordance with the requirements specified in 3.3.4.1 through 3.3.4.3. A drain shall consist of a nipple and drain valve. A by-pass shall consist of connecting lines and a by-pass valve.

3.3.4.1 Size of drains and by-passes. Standard drain and by-pass sizes shall be as shown in table II. Nonstandard sizes shall be as specified (see 6.2.1).

TABLE II. Standard drain and by-pass sizes.

Valve size (inches)	Size of by-pass and drains (inches)
2-1/2	1/2
3	1/2
4	3/4
5	3/4
6	3/4
8	1
10	1
12	1
14	1-1/4
16	1-1/4

3.3.4.2 Location. The location of drains and by-passes shall be specified by referencing the letter designation of the desired hoaset (see figure 1 and 6.2.1). Hoases shall be sufficient distance away from seating area to allow welding of replacement by-pass line without damage to valve seat. When nonstandard locations are required, a drawing shall be furnished by the user indicating the desired location. When a location is not specified, the following standard locations shall be used:

- (a) By-pass - "A" to "B" of figure 1 (for globe and Y pattern valves), "E" to "F" of figure 1 (for angle valves).
- (b) Drain - "C" of figure 1 (for globe and Y pattern valves).

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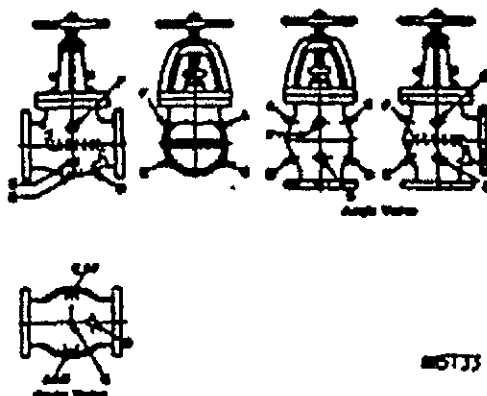


FIGURE 1. Designating of boss locations
for drains and by-passes.

3.3.4.3 Root connections. Drain and by-pass line root connections shall be welded to the valve body in accordance with MIL-STD-278. Materials for these lines shall be as follows:

- (a) Composition A - ASTM A335, grade P22.
- (b) Composition B - ASTM A335, grade P11.
- (c) Composition D - ASTM A106, grade B.

3.3.4.4 Bosses. When specified (see 6.2.1), bosses shall be required for valves of class 600 and above in sizes 3-1/2 inches and larger and valves less than class 600 in sizes 4 inches and larger, when these valves are furnished without a by-pass and drain. When specified (see 6.2.1), the valve bodies shall be provided with bosses as shown on "A", "B", and "C" of figure 1 for globe and Y pattern valves and as shown on "X" and "Y" of figure 1 for angle valves.

3.3.4.5 Drain and by-pass valves. Drain and by-pass valves shall be in accordance with MIL-V-22094 and shall have welding ends.

3.3.5 Body pattern. The body pattern, globe, angle, or Y pattern shall be as specified (see 6.2.1).

3.3.6 Port arrangement. Unless otherwise specified (see 6.2.1), the port arrangement on globe valves shall be in-line.

3.3.7 Weights and center of gravity. The manufacturer shall supply a calculated weight with his proposal. After completion of the first valve, a weight shall be shown on the drawing. When specified (see 6.2.1), the manufacturer shall submit center of gravity information for valves weighing in excess of 200 pounds. The estimated center of gravity location and the calculated center of gravity shall be as shown on the drawings. Handwheel operated, welded end globe, angle, and Y pattern valves shall not exceed the maximum weights listed in table III. Weights are based on valves with welded ends and do not include weights of drains, by-passes, operators, etc. Weights of valves in classes and sizes not listed in table III are not required.

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TABLE III. Maximum weights of welded end valves.

Valve size (inches)	Valve weights						
	Class 150	Class 300	Class 400	Class 600	Class 900	Class 1500	Class 2500
2-1/2	64	88	--	100	--	165	450
3	64	105	--	155	220	220	670
4	108	180	240	230	414	530	800
5	136	250	355	445	515	880	1775
6	207	385	730	600	778	880	2280
8	307	650	1100	600	840	2500	3500
10	500	1820	1630	1620	1800	2500	5000
12	720	1610	2090	2250	2500	3000	--
14	--	2375	--	3510	3900	3950	--
16	--	3000	--	--	5000	3600	--

3.3.8 Face-to-face and end-to-end dimensions. Face-to-face and end-to-end dimensions shall be in accordance with ANSI B16.10.

3.3.9 Shock and vibration. Valves shall withstand the shock requirements conforming to grade A, Class 1, type C of MIL-S-901 and MIL-STD-798. When specified (see 4.2.1), valves shall meet the vibration requirements of MIL-STD-167-1, type I.

3.3.9.1 Acceptance criteria for shock shall be as follows:

- (a) Momentary malfunction at the time of the impact blow is permitted and acceptable.
- (b) Permanent deformation, misalignment, and functional impairments shall be cause for rejection.
- (c) Permissible seat leakage shall be as specified in 4.5.3.2.

3.3.9.2 Shock and vibration with power operators. When power operators (other than handwheels) are required, shock and vibration shall be conducted on the assembly of the valve operator as a unit.

3.3.10 Bonnet and yoke construction.

3.3.10.1 Pressure seal and breach lock bonnets. Valves classes 600, 900, 1500, and 2500 shall have pressure seal or breach lock bonnets.

3.3.10.1.1 Threads. When retaining rings are threaded, the threads shall be either chromium or nickel-plated.

3.3.10.1.2 Bonnet seal rings. Bonnet seal rings shall provide a seal either by plastic or elastic expansion. Where a seal is obtained by means of plastic expansion, the seal ring shall have a Brinell hardness number (BHN) of 100 maximum. Where a seal is obtained by means of elastic expansion, the seal ring shall have a BHN of 140 maximum. Seal rings shall be silver-plated. Each manufacturer shall supply a list detailing oversized seal rings for repair purposes. The bonnet seal ring region of the valve body shall be inlaid with corrosion-resisting steel.

3.3.10.2 Flanged bonnets. Valves of classes 150, 300, and 400 shall have bonnets with the joint faces of bonnet flanges of the male and female or small tongue and groove type and spiral wound gaskets.

3.3.10.2.1 Bearing surfaces. Bearing surfaces of nuts and bolt heads and their respective mating surfaces on the valves shall be machine finished.

3.3.10.2.2 Fasteners. Fasteners shall be as follows:

- (a) Through-bolt type shall be bolt studs with studs threaded the entire length.
- (b) Studs of the single nut type shall have 1-1/4 diameters fully formed thread engagement, lead and vanishing threads shall not be considered.
- (c) Cap screws shall have 1 diameter fully formed thread engagement, lead and vanishing threads shall not be considered.

3.3.10.3 Yoke construction. Valves shall be of the outside screw and yoke design.

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3.3.11 Stuffing boxes and glands.

3.3.11.1 Stuffing boxes. Stuffing boxes shall be of a depth to accommodate packing that will assure a pressure tight seal at the rated pressure and temperature of the valve and to assure a positive engagement between the stuffing box and gland.

3.3.11.2 Glands. Stuffing box glands shall be secured and adjusted by a bolting arrangement which by adjustment will insure tightness of the stuffing box under all operating conditions. Bearing surfaces between the gland follower and the gland flange shall be spherically finished.

3.3.12 Trim.

3.3.12.1 Stem. Valve stems shall have modified Acme type threads.

3.3.12.1.1 The stem of a stop check valve shall not be attached to the disc. The end of the stem shall be constructed to serve as a disc guide throughout the full travel of the disc.

3.3.12.2 Disc construction.

3.3.12.2.1 Attachment of the disc to the stem of stop valve shall be of swivel construction. The use of balls or of slip-on type is prohibited in the design of the swivel feature in the stem to disc attachment. Furthermore, the combined design features of the disc and the swivel attachment shall be such that the disc will not spin when subject to the normal flow conditions of the valve.

3.3.12.2.2 The disc of stop check valves shall be of the piston guide and dash pot design. The disc shall fit into the body in such a manner as to serve as a guide during the full travel of the disc. The dash pot effect shall provide an effective cushion for the disc and prevent vibration and hammer at low velocities or pulsating loads. The disc shall be free of protrusions that could cause spinning of the disc.

3.3.12.2.3 For stop valves, provision shall be made to prevent galling between the end of the stem and the disc. This may be accomplished by the insertion of a hardened washer (485 Hminum) between the stem and disc, or by a pad of stellite inlaid on the inside of the disc at the point of contact or on the bottom of the stem. A cast stellite disc shall be satisfactory to meet this requirement.

3.3.12.3 Main seat construction. Seats may be of any of the following constructions:

- (a) Integral.
- (b) Threaded.
- (c) Welded-in.

When the threaded construction is used in valves intended for steam service, the seat ring shall be seal welded circumferentially so as to prevent leakage past the seat rings.

3.3.12.4 Back seat. Valves shall have a positive back seat. Class 600 and higher shall have hard facing (HF) back seats (see 3.3.12.6).

3.3.12.5 Valve trim material. Unless otherwise specified (see 6.3.1), valve trim materials shall be in accordance with table IV.

TABLE IV. Valve trim materials.

Service	Valve trim symbols ^{1/}			
	Stem	Disc ^{2/}	Seat ^{3/}	Temperature limitation °F
Steam ^{4/} Water ^{4/}	Cr 13	HF ^{2/}	HF	1850
	Cr 13	Ni-Cu	Cr 13	750
	Cr 13	HF	HF	1850
Oil	Cr 13	Ni-Cu	Cr 13	900
	Cr 13	Cr 13	Cr 13	1000
	Cr 13	HF	HF	1050

^{1/}See footnotes at top of next page.

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1/ MF may be substituted for other seats and discs under all steam temperature and service conditions.

2/ Where unlike seats and discs are used, either the seat or the disc may be Cr 13 or Ni-Cu at the manufacturer's option.

3/ Steam valves shall have MF seats and discs.

4/ Water valves pressure class 600 and higher shall have MF seats and discs.

3.3.13.6 Weld Faying. Welding materials shall be in accordance with type MIL-MCoCr-A of MIL-R-17131. The minimum finished thickness of MF seating surfaces shall be 1/32 inch.

3.3.13 Valve handwheels.

3.3.13.1 Rotation. Valves shall close by clockwise rotation of the handwheel when facing the handwheel.

3.3.13.2 Material and design. Handwheels smaller than 11 inches in diameter shall be of commercial design and manufactured from steel, ductile iron, malleable iron, or aluminum. Handwheels 10 inches in diameter and larger shall be of aluminum alloy or cast steel in accordance with the general dimensions of Drawing 5800-54824-1385620. Steam handwheel connection shall be in accordance with Drawing 5800-54824-1385620.

3.3.13.3 Size. Handwheels shall be sized so that a tangential force of not more than the value specified in table V is required to be exerted on the rim of the handwheel to effect tight closure (see 4.4.3.2). Valve operating devices may be necessary to accomplish effective closure.

TABLE V. Maximum allowable tangential force to seat valves based on valve handwheel size.

Handwheel diameter (Inches)	Tangential force (Pounds)
2	80
3	98
4	106
5	112
6	118
7	121
8	124
9	127
10	130
11	133
12	135
14	138
16	141
18	144
21	147
24	150
27	153
30	156
36	160

3.3.13.4 Hammer-blow wheel. Valves of class 600, sizes 4 inch and larger, and valves of class 1500, sizes 1 inch and larger shall be equipped with hammer-blow wheels unless a valve operator is specified.

3.3.13.5 Toggle operators. Toggle operators shall be of the double toggle design and shall consist of 2 equal length toggle arms with the toggle arrangement being mounted on the valve yoke. Valve clamp ring shall not be a part of the valve yoke or toggle operator. Toggle design shall include a means of avoiding overstressing of the valve stem by providing ample slope to limit the stress applied to the valve stem. A means shall be provided to assure a constant seating load on the valve seats when the valve is in the closed position.

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3.3.13.6 Power operators. Valves shall be designed to assure means of mounting special type power operators on the valve.

3.3.14 Seat leakage. Unless otherwise specified (see 6.2.1), allowable seat leakage is considered to be leakage of water not in excess of 10 cubic centimeters (cm³) per hour per inch of nominal pipe size when tested in accordance with 4.6.5.3.

3.3.15 Lubrication. Yoke bushings 1-1/2 inches and larger shall be equipped with a 1/8-inch threaded or push designed, type III lubricating fitting in accordance with MIL-V-3541 and MIL-STD-131.

3.3.16 Welding and fabrication.

3.3.16.1 Welding. Welding shall be in accordance with MIL-STD-278.

3.3.16.2 Fabrication. Fabricated assemblies shall be stress relieved as units prior to finish machining. Stress relieving shall be done in accordance with MIL-STD-278.

3.3.17 Assembly and disassembly. Valve design and construction shall assure that assembly and disassembly of the valve can be accomplished onboard ship by Navy shipboard personnel without the need for special training or special tools. Special tools are defined as those tools not listed in the National Supply Catalog (copies of this catalog may be consulted in the office of the Defense Contract Administration Service (DCAS)). Design and external configuration shall be such as to permit the use of a portable boring machine to repair the bonnet inlay of the valve with the valve in place in the piping system.

3.4 Body markings and identification plates.

3.4.1 Body markings. Valve bodies shall have the class and manufacturer's name or trademark cast or forged integral with the valve body. Globe valves shall have a bridge well marking in addition to the above markings. When necessary, metal stamping shall be permitted on the neck of the valve body or other similar areas not subjected to high stress in service.

3.4.2 Identification plates. Identification plates made of corrosion-resisting steel shall be permanently fastened to a part of the valve not subjected to working stress, preferably the yoke. Drawings of the proposed identification plates shall be reviewed by the procuring activity prior to their manufacture, and shall include the following data or a space therefor:

- (a) Manufacturer's name or trademark.
- (b) Size of valve and class.
- (c) Stop check valve, if so constructed.
- (d) Body and bonnet material composition.
- (e) Valve trim identification (stem-disc-seat).
- (f) Manufacturer's identification number (optional).
- (g) Manufacturer's drawing number.
- (h) MIL-V-22052.
- (i) Component identification number (CID).
- (j) National stock number (NSN).

3.5 Onboard repair parts. Onboard repair parts shall be as specified in table VI.

TABLE VI. Onboard repair parts.

Item	Quantities
Packings, gaskets, bonnet seal rings	50 percent of ship order but not less than two sets for each size, composition, and class
Valve disc and stem assembly	5 percent of ship order but not less than one complete set for each size, composition, and class

3.5.1 Repair parts (and special tools if required). When specified (see 6.2.1), repair parts (and special tools if required) shall be furnished in accordance with MIL-STD-1332 and MIL-STD-1341.

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1.6 Technical data. The contractor shall prepare technical data in accordance with the data ordering document included in the contract or order (see 6.2.2), and as specified in 1.6.1 through 1.6.2.

1.6.1 Drawings. In addition to the drawing content required by the data ordering document (see 6.2.2), the following features shall be included:

- (a) Accurately scaled sectional assembly which clearly depicts the design and construction of the valve.
- (b) Bill of material listing specification, grade, condition, and any other data required to fully identify the properties of the materials proposed.
- (c) Details of the seat, disc, and stem assembly and all other replaceable internal trim.
- (d) Layout of the pressure-containing envelope (body and bonnet) giving dimensions which control compression of the spiral-wound gaskets and pressure seal ring. This is to assure that where remachining is necessary to repair the gasket-sealing surfaces on these parts, that compensating cuts can be accurately made to restore original gasket compression. This layout shall also specify the dimensional limits of such corrective remachining within which function of the valve remains unaffected.
- (e) Recommended assembly torques, or equivalent procedures, for making up all joints and threaded assemblies.
- (f) Tabulation of required gasket characteristics including all dimensions (with tolerances) and load versus compression characteristics (with tolerances).
- (g) Mark areas to be radiographic, magnetic particle, or dye penetrant inspected.
- (h) Dimensions-overall, accessibility space including disassembly clearances and all dimensions pertinent to installation.
- (i) Surface finishes-show finish marks for all hard face surfaces and bearing areas.
- (j) Name of laboratory conducting tests and date of previous successful shock and vibration tests.
- (k) Welding procedure for seal canopy. Welding procedures shall include the following:
 - (1) Detail of weld.
 - (2) Welding process.
 - (3) Welding current (where applicable).
 - (4) Filler metal.
 - (5) Preparation.
 - (6) Interpass temperature.
 - (7) Technique.
 - (8) Post heat treatment.
 - (9) Provide a table listing size of weld, number of passes, electrode diameter, and welding characteristics.

1.6.1.1 Certification data. Certification data sheets shall be prepared by the contractor (see 6.2.2). In addition to the general requirements, the certification data sheets shall include the following:

- (a) Class.
- (b) Pressure and temperature rating.
- (c) Body and bonnet material.
- (d) Seat, disc, and stem material.
- (e) Type of power operator, if required.
 - (1) Shock and vibration tests of valve with the power operator attached.

1.6.1 Manuals. In addition to the general requirements for technical manuals (see 6.2.2), the following shall be included as part of the contents:

- (a) Drawings for the valve (including certification data sheet). Drawings shall be supplemented by additional illustrations where necessary to adequately illustrate operation and maintenance. These additional illustrations may consist of blowouts, partial or full sections, etc., and may eliminate extraneous lines and details to clarify the interaction of parts.
- (b) Table listing wrench sizes and assembly torques (or other equivalent procedures) for making up all joints and threaded assemblies.
- (c) Instructions to permit overhaul by shipyard or other repair facility. These should include procedures for checking all critical dimensions subject to wear or change and the acceptable dimensional limits, surface finish condition, etc. Also, the appropriate procedure (that is, part replacement, correction at repair facility, or repair at manufacturer's facility) which should be followed to correct each case of damage or wear.

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- (d) Detailed disassembly and reassembly procedures. In addition to providing procedures for the complete disassembly and reassembly of the equipment, maintenance and troubleshooting sections shall contain, or refer to, only the limited disassembly and reassembly required to accomplish each particular operation. This is intended to reduce the possibility of unnecessary disassembly and unnecessary disturbance of adjustments when performing specific or limited maintenance or troubleshooting operations.
- (e) Adjustment procedures.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Inspection system program plan. The contractor shall provide and maintain an inspection system program plan in accordance with the data ordering document included in the contract or order (see 6.2.2).

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

- (a) Qualification inspection (see 4.3).
- (b) Quality conformance inspection (see 4.4).

4.3 Qualification inspection. Qualification inspection shall be conducted at a laboratory satisfactory to the Naval Ship Engineering Center (NAVSEC). Qualification shall consist of the examinations and tests specified in 4.3 through 4.7.

4.3.1 Qualification inspection samples. Sample valves submitted for qualification inspection shall be of the 7-1/2 inch size, special class 1500, composition B. Valves of the 2-1/2-inch size, class 1500, composition B, which have passed the qualification tests will qualify valves in sizes 2-1/2 inches and larger of all compositions, classes 600, 900, 1500, and 2500, provided variations in design throughout the various sizes and classes are demonstrated by analysis to be satisfactory to NAVSEC.

4.3.2 Authorization for qualification tests. Prior to authorization of qualification tests, the drawings specified in 1.6.1 shall be submitted to NAVSEC for review.

4.4 Quality conformance inspection. Each special class valve shall be examined and tested as specified in 4.5, 4.6.1, and 4.6.3. Each standard class valve shall be examined and tested as specified in 4.5, 4.6.1.4, and 4.6.3. The DCAS shall normally accept certification that materials comply with the specification, however, proof of compliance may be required by the DCAS.

4.5 Visual and dimensional examination. Valves shall be visually and dimensionally examined to verify compliance with the requirements of this specification not involving tests.

4.6 Tests.

4.6.1 Nondestructive testing.

4.6.1.1 Pressure containing castings of valves shall be 100 percent radiographically inspected when the service pressure or temperature will exceed the values listed in table VII. Inspection shall be in accordance with the following:

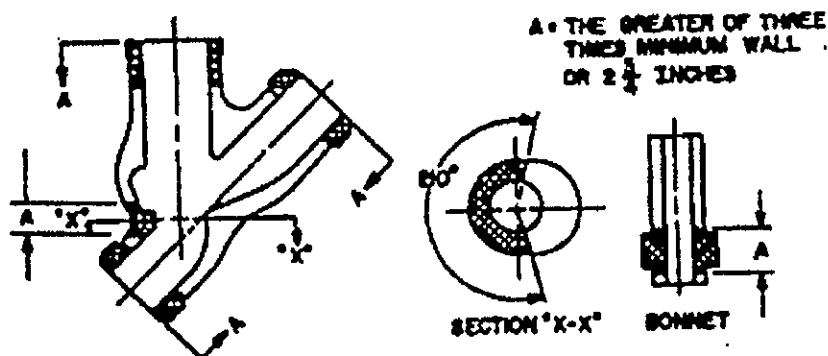
- (a) Radiographic inspection shall conform to MIL-STD-271.
- (b) Radiographic acceptance shall conform to MIL-STD-278.
- (c) Radiographic coverage shall conform to the shaded areas shown on figures 2 and 3.

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TABLE VII. Pressure or temperature
criteria for nondestructive
testing.

Service ^{1/}	Gage pressure pounds per square inch (lb/in ²)	Temperature (°F)
Steam	225	500
Water	600	300
Oil	300	150

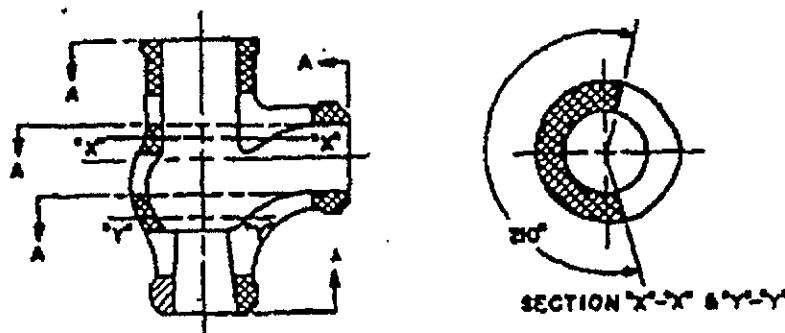
^{1/}When valves are used in services other than those listed, the criteria for nondestructive testing shall be as specified (see 6.3.1).



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FIGURE 2. Y-pattern globe body (pressure seal bonnet).

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SH11280

FIGURE 3. Angle body (pressure seal bonnet) bonnet same as "Y" pattern globe.

4.6.1.2 Pressure containing forgings of valves shall be 100 percent magnetic particle inspected in accordance with MIL-STD-271 when the service pressure or temperature exceeds the values listed in table VII. Forgings shall be free from flaws such as seams, cracks, laps, porosity, scale, flakes, and all other defects detrimentally affecting the suitability of the forging for the service intended.

4.6.1.3 Defects to be repaired. The following shall apply to those parts inspected in accordance with 4.6.1.1 and 4.6.1.2:

- (a) Defects less than 0.030 inch in depth need not be repaired provided the bottom of the defect is rounded and visible and the minimum wall thickness is maintained.
- (b) Defects greater than 0.030 inch in depth but less than 15 percent of the wall thickness shall be repaired by removing the defective material. This material shall be removed by drilling or grinding to a bottom radius of at least three times the depth of the defect. The depth of the finished repair shall be less than 15 percent of the undamaged wall thickness. Sharp corners shall be faired into the base metal. Welding is not required to effect a repair of this nature, provided the minimum wall thickness is maintained.
- (c) Defects greater than 15 percent of the wall thickness shall be repaired by removing the defective material and welding. The material shall be removed by grinding or drilling and then welded in accordance with 3.3.16. The crown of the weld shall be blended into the base metal.

4.6.1.4 Hard faced coating. Hard faced coating surfaces shall be liquid penetrant inspected in accordance with MIL-STD-271 after rough machining and shall be free of cracks or crack-like defects.

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4.4.2 Cold tests. Cold tests shall be performed as follows:

- (a) Operation - 10 cycles.
- (b) Hydrostatic - shell and closure tests (see 4.6.5.1 and 4.6.5.2).

4.6.1 Hot tests. Hot tests shall be conducted with a gage pressure of 1200 lb/in² steam at 950°F and shall be performed in the following sequence:

- (a) Thermal shock.
- (b) Operation - 200 cycles.

4.6.1.1 Thermal shock tests. Valves shall be thermal shocked ten times by reducing the steam temperature from 950°F to 400°F in not more than 30 seconds.

4.6.1.2 Operational tests. Steam shall be passed through the valve for a period of not less than 48 hours. During this period two securing trials shall be made to determine if the valve remains tight while and after cooling to ambient temperature, and two warm-up trials shall be made to determine the torque required to open the valve which has been closed while cold. The valve shall be cycled a minimum of 200 times and the operating torque shall be recorded periodically during the cycling.

4.6.4 Shock and vibration. Valves shall be shock and vibration tested to determine conformance to the requirements specified in 3.3.9.

4.6.5 Hydrostatic tests. Valves shall be subjected to the tests specified in 4.6.5.1 for strength and porosity and the tests specified in 4.6.5.2 for tightness. Water temperature shall not exceed 100°F.

4.6.5.1 Shell test. Valves shall be given a shell test at a gage pressure no less than 1-1/2 times the 100°F rating, rounded off to the next higher 25 lb/in² increment. The test shall be made with water, which may contain a corrosion inhibitor, or with kerosene, or with other suitable fluid, provided such fluid has viscosity not greater than that of water, at a temperature not above 125°F. Visually detectable leakage through pressure boundary walls is not acceptable. Test duration shall be not less than as follows:

Valve size (ps (inches))	Test time (seconds)
3-1/2 - 8	60
10 and larger	180

Test shall be made with the valve in the partially open position. Leakage through the stem packing shall not be cause for rejection.

4.6.5.2 Closure tests. Following the shell test, valves shall be given a closure test. Each valve 10 ps and larger, regardless of class and each valve in the size range 4 ps through 8 ps, class 600 and higher shall be given a closure test using a fluid described in 4.6.5.1 at a pressure no less than 110 percent of the 100°F pressure rating. Each valve 4 ps through 8 ps, class less than 600 and each valve in size less than 4 ps, regardless of the pressure rating shall, be given either a fluid closure test at a pressure no less than 110 percent of the 100°F pressure rating or a gas closure test at a minimum gage pressure of 80 lb/in². The test pressure shall be applied successively on each side of the closed valve. Leakage rate of fluid test shall not exceed 10 cm³ per hour per inch of nominal pipe size. Air test under water shall not allow the formation of a free air bubble. Duration of closure test shall be the same as specified in 4.6.5.1.

4.6.5.2.1 For globe and angle valves, the test pressure shall be applied across the closure member in the direction producing the most adverse seating condition. A stop check valve or other valve type designed to be a one-way valve, requires a closure test only in the appropriate direction.

4.6.5.2.2 Valves designed for operating conditions, that have the pressure differential across the closure member limited to values less than the 110 percent pressure rating and having closure members or actuating devices (direct, mechanical, fluid, or electrical) that would be subject to damage at high differential pressures, shall be tested as described above except that the closure test may be reduced to 110 percent of the maximum specified closed position differential pressure. This exception may be exercised upon agreement between the Navy and manufacturer. The manufacturer's nameplate data shall include reference to any such limitations.

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4.7 Examination after qualification tests. Valves shall be disassembled and shall be visually and dimensionally examined for damage and wear. Disassembly and reassembly shall be performed to determine the practicability of maintaining a valve of this design for shipboard use (see 3.3.17). The maintainability demonstration shall be conducted by removing and replacing the pressure seal ring, disc, and stem. This shall be accomplished by following the instructions in the technical manual. Particular emphasis shall be directed towards the possibility of loss of small parts by the maintenance crew.

4.8 Inspection of preparation for delivery. Preservation-packaging, packing, and marking shall be inspected for compliance with section 5 of this document.

5. PREPARATION FOR DELIVERY

(The preparation for delivery requirements specified herein apply only for direct Government procurements. For the extent of applicability of the preparation for delivery requirements of referenced documents listed in section 2, see 6.4.)

5.1 Preservation-packaging, packing, and marking. Valves shall be individually preserved-packaged level A or C, packed level A, B, or C, as specified (see 6.2.1), and marked in accordance with MIL-V-3.

5.2 Repair parts and tools. Repair parts and tools shall be preserved-packaged, packed, and marked for the level specified (see 6.2.1) in accordance with MIL-R-196.

5.3 Cushioning, dunnage, and wrapping materials.

5.3.1 Level A preservation-packaging and levels A and B packing. Use of all types of loose-fill materials for packaging and packing applications such as cushioning, filler, or dunnage is prohibited for materials destined for shipboard installation/stowage.

5.3.2 Level C preservation-packaging and packing. When loose-fill type materials are used for packaging and packing applications such as cushioning, filler, and dunnage, all containers (unit, intermediate, and shipping) shall be marked or labelled with the following information:

"CAUTION

Contents cushioned etc., with loose-fill material.
Not to be taken onboard ship.
Remove and discard loose-fill material before
shipboard stowage.
If required, recushion with cellulosic material,
bound fiber, fiberboard, or transparent flexible
cellular material."

5.3.3 Cushioning, filler, dunnage, and wrapping materials selected, whenever available, shall exhibit improved performance for resistance to fire.

6. NOTES

6.1 Intended use. Globe, angle, and Y pattern valves are intended for use in steam, water, and oil services.

6.2 Ordering data.

6.2.1 Procurement requirements. Procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Composition and rating required (see 1.2).
- (c) End preparation (see 3.3.3).
- (d) Size required (see tables II and III).
- (e) Nonstandard sizes of drains and by-passes (see 3.3.4.1).
- (f) Service conditions.
- (g) Quantity required.
- (h) Location of drains and by-passes (see 3.3.4.2).
- (i) Boss requirements (see 3.3.4.4).
- (j) Pattern required (see 3.3.5).
- (k) Port arrangement on globe valves (see 3.3.6).
- (l) Center of gravity location (see 3.3.7).

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- (m) Whether vibration test is required (see 3.3.9).
- (n) Valve trim (see 3.3.12.3).
- (o) Allowable seat leakage (see 3.3.14).
- (p) Repair parts and special tools required (see 3.5.1).
- (q) Criteria for nondestructive testing when valves are used in services other than as listed (see table VII).
- (r) Level of preservation-packaging and packing required (see 5.1).
- (s) Level of preservation-packaging and packing of repair parts and tools required (see 5.3).

6.2.2 Data requirements. When this specification is used in a procurement which invokes the provision of the "Requirements for Data" of the Armed Services Procurement Regulations (ASPR), the data identified below, which are required to be developed by the contractor, as specified on an approved Data Item Description (DD Form 1564), and which are required to be delivered to the Government, should be selected and specified on the approved Contract Data Requirement List (DD Form 1423) and incorporated in the contract. When the provisions of the "Requirements for Data" of the ASPR are not invoked in a procurement, the data required to be developed by the contractor and required to be delivered to the Government should be selected from the list below and specified in the contract.

Paragraph	Data requirements	Applicable DTD	Option
3.6.1 and 3.6.1.1	Drawings, engineering and associated lists	DI-Z-7031	Level 2 Design activity designation - Contractor Drawing Number - Contractor Delivery of hard copies - Procuring activity
3.6.2	Manuals	DI-M-2043	MIL-M-15071, type 1
4.1.1	Inspection system program plan	DI-R-4803	---

(Copies of data items descriptions required by the contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.)

6.2.2.1 The data requirements of 6.2.2 and any task in section 3, 4, or 5 of the specification required to be performed to meet a data requirement may be waived by the procuring/purchasing activity upon certification by the offeror that identical data were submitted by the offeror and accepted by the Government under a previous contract for identical item procured to this specification. This does not apply to specific data which may be required for each procurement, regardless of whether an identical item has been supplied previously (for example, test reports).

6.2.2.2 Where the Government has limited rights in the data shown on the drawings, as determined by the contractual provisions regarding rights in technical data, the drawings may be marked with a legend. If used, the "Limited Rights Legend" of ASPR should be used.

6.3 With respect to products requiring qualification, awards will be made only for products which are at the time set for opening of bids, qualified for inclusion in applicable Qualified Products List (QPL-1205) whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. The activity responsible for the Qualified Products List is the Naval Ship Engineering Center, Department of the Navy, Washington, DC 20362, and information pertaining to qualification of products may be obtained from that activity. Application for qualification tests shall be made in accordance with "Provisions Governing Qualification SD-6" (see 6.3.1).

6.3.1 Copies of "Provisions Governing Qualification SD-6" may be obtained upon application to Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120.

6.4 Sub-contracted material and parts. The preparation for delivery requirements of referenced documents listed in section 1 do not apply when material and parts are procured by the contractor for incorporation into the equipment and lose their separate identity when the equipment is shipped.

INSTRUCTIONS: In a continuing effort to make our standardization documents better, the DoD provides this form for use in submitting comments and suggestions for improvements. All users of military standardization documents are invited to provide suggestions. This form may be detached, folded along the lines indicated, taped along the loose edge (*DO NOT STAPLE*), and mailed. In block 6, be as specific as possible about particular problem areas such as wording which required interpretation, was too rigid, restrictive, loose, ambiguous, or was incompatible, and give proposed wording changes which would alleviate the problems. Enter in block 6 any remarks not related to a specific paragraph of the document. If block 7 is filled out, an acknowledgement will be mailed to you within 30 days to let you know that your comments were received and are being considered.

NOTE: This form may not be used to request copies of documents, nor to request waivers, deviations, or clarification of specification requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

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